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ABSTRACT

This Systems and Procedures Exchange Center (SPEC) kit presents the results of a survey of library members of the Association of Research Libraries (ARL) which assessed their perceptions of expert systems and determined their level of expert system development activity; 78 of these ARL libraries returned useable surveys, and 7 submitted planning documents, which are included in the kit. The survey also identified the types of tools used to build the systems, the staff involved in the expert systems projects, the length of time needed to develop the system, the types of knowledge bases and interfaces employed, and the kind of hardware needed to support the systems. It was found that the vast majority of libraries (89%) had not developed an expert system. Of the five libraries that had developed expert systems, four indicated that their systems were used in a reference department. One library indicated that two expert systems were used in a science and engineering branch library; one of these systems was intended for staff training, and the other was used for reference purposes. Although most ARL libraries believe that expert systems will be an important technology in this decade, few are currently developing such systems. It is expected that in the short-term ARL libraries are likely to develop low-cost expert system shells to create small-scale expert systems that deal with very restricted problem areas. One proposal for an expert system and planning documents for six existing systems are introduced by a summary of the analysis of the data and a copy of the questionnaire with a tally of the responses for individual questions. (6 selected readings) (MAB)

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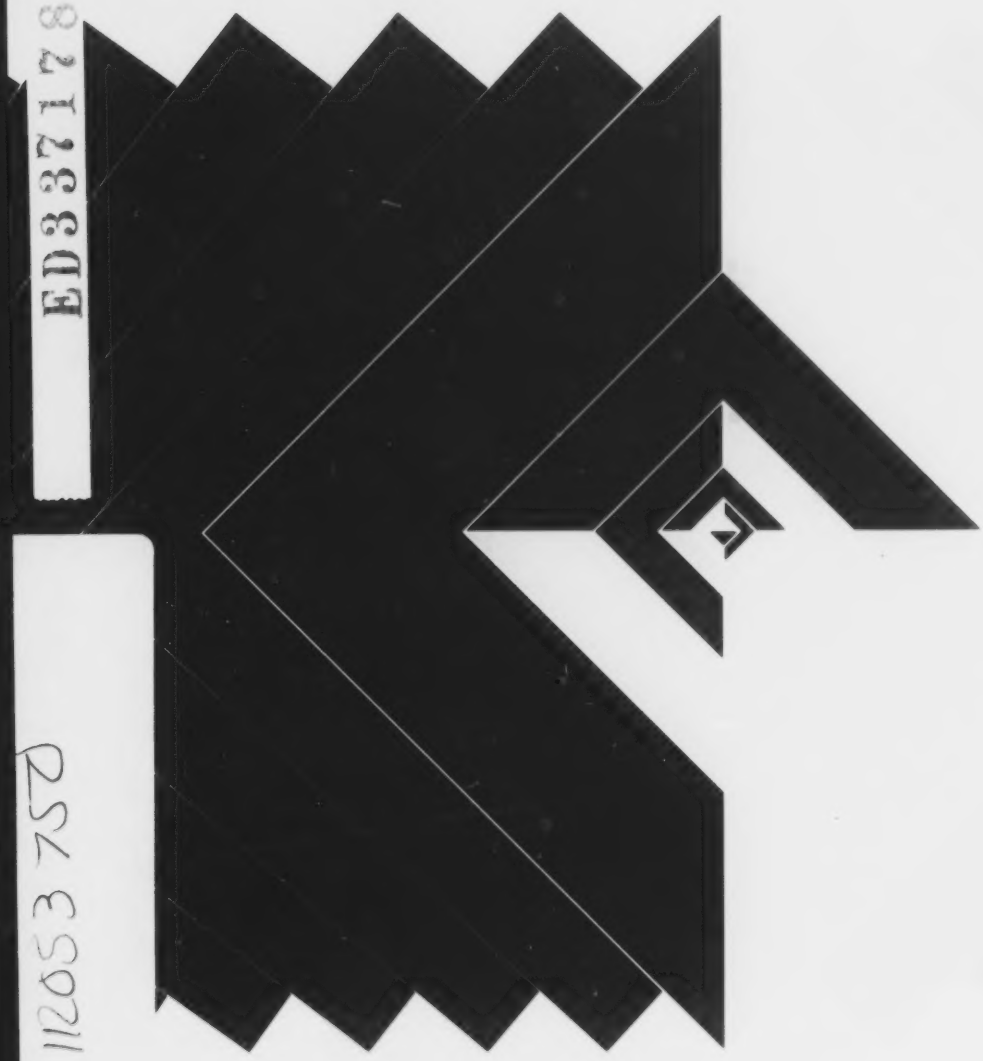
SYSTEMS AND PROCEDURES EXCHANGE CENTER

Kit 174

Expert Systems in ARL Libraries
May 1991



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SPEC

SYSTEMS AND PROCEDURES EXCHANGE CENTER

Flyer 174

Expert Systems in ARL Libraries

May, 1991

INTRODUCTION

Library expert systems capture the specialized knowledge of library staff and make this expertise available when and where it is needed. Expert systems have three basic parts: (1) a knowledge base that contains facts, rules, and other representations of human knowledge about a specific subject; (2) an inference engine that solves problems by analyzing the knowledge base in a manner that resembles human reasoning; and (3) a user interface that allows the user to query the system and understand its reasoning process.

Most expert systems deal with a restricted and reasonably well-defined area of knowledge, and they have fairly limited reasoning capabilities when compared with human beings. For example, expert systems lack common sense reasoning. Human beings have a rich store of knowledge about the real world. They know that things fall when dropped and that fish live in water. Given current technological limitations, expert systems cannot match the wide-ranging contextual knowledge of human beings; however, they can have extensive knowledge in one specialized area. As long as a user's questions stay within this narrow area, the expert system can provide useful, "expert" advice.

Most library expert systems are developed using low-cost expert system shells, such as VP-Expert. These expert system shells simplify the process of creating an expert system. Typically, the system developer enters knowledge in the form of a series of IF-THEN rules, such as "IF the Subject is Education AND the Format is CD-ROM, THEN the Index is OnDisc ERIC." Alternatively, the system developer may enter knowledge in labeled rows and columns--much like a spreadsheet--and the expert system shell will create rules based on the relationship between the variables. This process is called induction.

Low-cost expert system shells permit the rapid development of expert systems; however, many of these shells can only handle a fairly small amount of knowledge before performance degrades or the system runs out of working memory. Other potential problems include a limited repertoire of knowledge representation methods, rudimentary user interface tools, and difficulty in maintaining knowledge bases once they grow past a certain size. Nonetheless, low-cost expert system shells are an excellent way to introduce staff to expert system technology and to build small, useful systems.

A less common method of creating library expert systems is to utilize an artificial intelligence programming language, such as Prolog, or a conventional programming language, such as C. This strategy provides the maximum amount of flexibility in system development; however, it requires a considerable amount of effort. This is because programming languages do not have built-in expert system capabilities like expert system shells do. The programmer must develop needed capabilities. Fortunately, they are a growing number of expert system "toolkits" that provide the programmer with program modules that have expert system capabilities. These modules can be incorporated into an expert system program, freeing the programmer to focus on issues related to the desired functionality of the expert system.

No matter what system development strategy is used, knowledge engineering must occur. Either formally or informally, the developer of a library expert system must analyze and codify the knowledge related to the task that the expert system will perform. This process can be more difficult than one might imagine. Human experts cannot always clearly articulate how they make decisions, and, if they can do so, the decision-making process can be complex, involving numerous interacting variables.

Given the difficulties associated with knowledge engineering, prototyping is often used to incrementally clarify the workings of the expert system. In prototyping, the system developer produces a series of working "rough drafts" of the system, rather than attempting to complete the system all at once. Library staff interact with the prototypes and make suggestions for improving the system. Eventually, a final production system is created.

SURVEY RESULTS

The expert system survey was developed to assess ARL libraries' perceptions about expert systems and to determine their level of expert system development activity. The survey

was sent to all ARL members in the spring of 1990. Seventy-eight libraries completed and returned useable surveys.

In response to a question about when expert systems would become an important technology in libraries, two libraries (3%) indicated 1990, twenty-eight (36%) said 1991-1995; twenty-six libraries (33%) indicated 1996-2000, and four (5%) said beyond the year 2000. Thirteen libraries (17%) did not know. Five libraries (6%) did not answer this question.

The vast majority of libraries, sixty-nine (89%), had not developed an expert system. When asked why they had not developed an expert system, twenty-six (38%) of these libraries said that expert system development was too time consuming. Twenty-six (38%) indicated that they lacked staff-expertise to develop expert systems. Fourteen (20%) said that expert systems were too expensive. Nine (13%) indicated that they were too complicated. Four (6%) said that they were not useful. Forty-two libraries (61%) had a variety of other reasons for not developing an expert system, with "other priorities" being a common response. One library (1%) did not answer this question. (Respondents could check all reasons that applied.)

Five libraries (6%) had developed expert systems. Three libraries (4%) indicated that they were also involved in system development projects; however, these applications were hypertext or text management systems, not expert systems. One library (1%) planned to develop an expert system.

Expert System Projects. Of the libraries that had developed expert systems, four indicated that their expert systems were used in a reference department. One library indicated that two expert systems were used in a science and engineering branch library; one of these systems was intended for staff training, and the other was used for reference purposes.

A diversity of tools were used to build these systems, and the time required to do development work varied considerably: Digital Authoring Language (40 months), 1st Class (8 months), Knowledge Pro (4 months), Knowledge Pro (under development), Turbo Prolog (29 months), and VP-Expert (3 months).

In three libraries, departmental staff did the expert system development work. In one library, departmental staff provided expertise and an outside contractor did the programming. In another library, a project team made up of departmental staff and a systems librarian developed the system.

The number of staff involved in the expert system projects varied considerably: one, two, four, and five or more (two libraries).

The three libraries that had employed expert system shells indicated that the expert system project took a "moderate effort." The two libraries that did not employ expert system shells said that the project was "difficult." Both of these libraries indicated that expert system development was very complicated and time consuming, and it required considerable staff expertise and project coordination.

Knowledge was most commonly represented as rules (four libraries); however, lists were used by one library, and frames were used in addition to rules by another library. Menu selection was the normal user interface strategy (five libraries); however, hypermedia, natural language, and prompts (two libraries) were also employed.

The majority of libraries (four) used an IBM-compatible microcomputer to support the system. One library used a VAX 11/785 minicomputer.

ISSUES AND TRENDS

Expert systems are just beginning to be utilized in ARL libraries. Although most ARL libraries believe that expert systems will become an important technology in this decade, few ARL libraries are developing expert systems.

In the short-term, the most likely type of expert system development to occur in ARL libraries is the use of low-cost expert system shells to create small-scale expert systems that deal with very restricted problem areas. Larger, more complex systems will require a significant investment of resources. If innovative ARL libraries design their expert systems to be portable, other libraries will potentially benefit from their efforts, and the use of expert systems will spread more quickly.

This kit and flyer was compiled by Charles W. Bailey, Jr., Assistant Director for Systems and Judy E. Myers, Assistant to the Director, University of Houston Libraries. This kit was prepared as part of the OMS Collaborative Research/Writing Program.

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SYSTEMS AND PROCEDURES EXCHANGE CENTER

Kit 174

Expert Systems in ARL Libraries

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SURVEY RESULTS

ASSOCIATION OF RESEARCH LIBRARIES
OFFICE OF MANAGEMENT SERVICES
1527 New Hampshire Avenue, N.W., Washington, D.C. 20036
202-232-8656 FAX 202-462-7849

TO: SPEC Liaisons

FROM: C. Brigid Welch, Program Officer for Information Services
Charles Bailey, Asst. Director for Systems, University of Houston Libraries

DATE: 22 March 1990

SUBJ: SPEC Survey and Call for Documents – Use of Expert Systems in Research Libraries

PLEASE ROUTE TO SYSTEMS LIBRARIAN

SPEC Survey – Use of Expert Systems in Research Libraries

Name: _____ Title: _____

Institution/Library: _____

Telephone: _____

1. Expert systems will become an important technology in libraries in:

   2 1990
   28 1991-1995
   26 1996-2000
   4 Beyond 2000
   0 Never
   13 Don't know

2. Has your library developed or is it developing an expert system?

   9* Yes If **Yes**, please complete the following questions. *3 were not expert systems one was planned.
   69 No If **No**, please skip to question 15.

3. Please give the name of the expert system (if any), its development status (planned, in development, or completed), and the name of the programming language or expert system shell used to create the expert system. **ENCLOSE PROJECT PLANNING DOCUMENTS AND REPORTS.** (See documentation in kit)

System Name	Status	Language/Shell

4. In which library department will the expert system be used? (Please use a generic department name such as cataloging, library instruction, reference, etc.)

   Department: Reference (4) Science & Engineering Branch Library (1)

5. Is the expert system intended for staff or patron use?

__1__ Staff __5__ Patron In one library, one system was used by patrons and another was used by staff.

6. What is the purpose of the expert system? **ENCLOSE SYSTEM USER MANUALS AND HANDOUTS.**

7. Who is involved in creating the expert system?

__3__ Departmental staff do all the work.
__1__ Departmental staff provide subject expertise, and library systems staff do programming.
___ Departmental staff provide expertise, and computer center staff do programming.
__1__ Other. Please describe:
Departmental staff provide expertise and an outside contractor does the programming.

8. How many people were involved in the development of the expert system?

__1__ 1 __1__ 2 _____ 3 __1__ 4 __2__ 5 or more

9. If the expert system is completed, how many months did it take to develop the expert system?

Number of months (in whole numbers): ___
3,4,8,29,40

10a. If the expert system is completed, how difficult was it to create the expert system?

_____ Easy __3__ Moderate effort __2__ Difficult _____ Very difficult

10b. If you answered "Difficult" or "Very difficult" above, please indicate major factors involved (check all that apply):
__2__ Very complicated
___ Very expensive
__2__ Very time consuming
__2__ Considerable staff expertise required
__2__ Substantial project coordination/management required
___ Other. Please describe:

11. What knowledge representation scheme is used? (Check all that apply.) ENCLOSE **PRINTOUTS OF REPRESENTATIVE DATA.**

__1__ Frames __4__ Rules _____ Scripts _____ Semantic Networks
__1__ Other. Please describe below:
Lists.

12. What user interface strategies are used? (check all that apply.) **ENCLOSE PRINTOUT OF SCREEN DISPLAYS.**

5 Menu selection
1 Natural language (e.g., user types in free text)
2 Prompt user input (e.g., type yes or no)
1 Other. Please describe below:
Hypermedia.

13. Does the system include an explanation capability where the system tells the user how it arrived at its conclusions? **ENCLOSE SAMPLE EXPLANATIONS.**

__ yes 5 no

14. What hardware does the system run on? (Please specify the manufacturer and model number, such as IBM AT or Macintosh SE.)

IBM compatible microcomputer (4)
VAX 11/785 (1)

If you are developing or have developed an expert system, please **STOP** here and return.

15. My library is not developing an expert system because: (please check all that apply.)

4 Don't think expert technology is useful
9 Too complicated to develop
14 Too expensive
26 Too time-consuming
26 No staff expertise
42 Other. Please describe:

Return documents and completed survey by 27 April 1990 to:

Charles Bailey
Asst. Director for Systems
University Libraries
University of Houston
Houston, Texas 77204-2091

SYSTEMS AND PROCEDURES EXCHANGE CENTER

PROPOSALS

PROPOSAL FOR AN EXPERT SYSTEM

Purpose:	To provide ready reference information and library policies and procedures for library staff and faculty.
Development Tool:	The intended tool was PC Plus.
Contact:	Nancy J. Butkovich Science and Technology Reference Librarian Reference Division Sterling C. Evans Library Texas A&M University College Station, TX 77843-5000 (409) 845-5741 E-Mail: K026RF@TAMUVM1
Note:	The expert system described in this proposal was not developed. Instead, an Inmagic program was written to accomplish the same objective.

DATE: 11/6/87

LIBRARY RESEARCH COMMITTEE
STERLING C. EVANS LIBRARY
TEXAS A&M UNIVERSITY

RESEARCH PROPOSAL

Name: (principal investigator): Nan Butkovich and Ann Moore

Position: Reference Librarians Department: Reference

Co-investigator(s) if any (name, position): Kathy Taylor, Library Assistant II

PROJECT TITLE: Selection and Implementation of an Expert System for Reference

		Level I	Level II	Level III
Grant funds requested:	Travel	0	0	0
	Supplies	25	25	25
	Salaries	0	20	20
	Permanent equipment	1000	1000	2245
	Computer time	0	0	0
	TOTAL:	1065	1085	2310

(For advice on expenditures, call Library Research Coordinator, 845-8111.)

1. **Description or abstract of the project** (Maximum 200 words):

This project will study the planning, creation, implementation and evaluation of an expert system for use with Technical Writing classes. Students in Technical Writing classes complete an assignment which requires them to locate key reference sources in a particular field. This assignment involves many hundreds of students and and strains reference desk staff resources. Since the assignment is predictable and tightly structured, we decided to develop an expert system database. In close cooperation with a Technical Writing instructor, the assignment will be analyzed to determine types of sources most frequently used, and class rolls will be examined to pinpoint majors most frequently represented. The software selection will be made according to predetermined criteria. A database will be built, and a user's manual will be produced in order to assist patrons. Reference staff will be trained in the use of the system, and student and staff reactions to the expert system will be solicited via questionnaires. Statistics on the cost of equipment and software, and on the manpower required to construct the database will be collected.

2. **Problem statement**:

Each semester students enrolled in English 301 (Technical Writing) classes are required to complete a library assignment, which leads students through the preliminary steps of library research. For this assignment the students must compile a list of standard reference sources, i.e. bibliographies, dictionaries, encyclopedias, etc. in a particular field of study. Hundreds of students sign up for this course each semester, and projected enrollment figures are expected to increase dramatically. This assignment can require extensive individual assistance by reference desk staff whose services are also required by other patrons. Expert systems, especially with natural language capabilities, can answer simple, straightforward questions, allowing reference staff to handle more complex queries. Expert systems have the potential for other applications, such as training or ready reference. This project would provide valuable information on cost in terms of staff time and funding and reactions by users and staff. Informed decisions based on the results of this study could be made by Evans Library and other libraries for possible future uses for expert systems.

3. **Literature review**:

An expert system is a computer-based system which not only stores and manipulates data but also can apply the data contained within it and arrive at a reasonable solution to a particular problem posed by the operator (1).

LIBRARY LITERATURE, ERIC, INFORMATION SCIENCE ABSTRACTS, LIBRARY AND INFORMATION SCIENCE ABSTRACTS and **EDUCATION INDEX** were searched for articles concerning the use of expert systems in the reference setting. Because of the "newness" of expert system technology, particularly in regard to reference work, little research has been published to date.

The technical problems in developing an expert system (PLEXUS) for use in a reference setting and the structure used in searching that system are discussed in Vickery, Brooks, and Robinson (2) and Vickery and Brooks (3).

Micco and Smith (4) used an expert system for developing strategies prior to searching a topic online.

An expert system currently in use at the National Agricultural Library is described by Waters (5). This system can be used to tap into external information sources as well as a local database and provided textual as well as bibliographic information.

Smith developed an expert system for use at the reference desk in the government documents department of an academic library with severe staffing problems. Smith stresses the potential of an expert system "to provide a consistent, if minimal level of service at the reference desk freeing the librarian to work on problems requiring more creativity." (6)

Preliminary work done at Texas A&M by Alexander, Butkovich and Taylor (7) and Butkovich, Taylor, Dent, and Moore (8) showed that an expert system could be applied to the problem presented by the Technical Writing classes. However, the system software selected for the prototype did not have the sophistication needed to handle a full-scale database.

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(1) Hayes-Roth, F, 1987. "Expert Systems," in Shapiro, Stuart C., ed. **Encyclopedia of Artificial Intelligence.** New York, NY: John Wiley & Sons, pp 287-298.

(2) Vickery, Alina, Helen Brooks and Bruce Robinson, 1987. "A Reference and Referral System Using Expert System Techniques." **Journal of Documentation** 43: pp 1-23.

(3) Vickery, A. and H.M. Brooks, 1987. "PLEXUS-The Expert System for Referral." **Information Processing and Management** 23: pp 99-117.

(4) Micco, H. Mary and Irma Smith, 1986. "Designing an Expert System for the Reference Function Subject Access to Information." **ASIS '86:Proceedings of the 49th ASIS Annual Meeting** 23: pp 204-210.

(5) Waters, Samuel T., 1986. "Answerman, the Expert Information Specialist: An Expert System for Retrieval of Information from Library Reference Books." **Information Technology and Libraries** 5: pp 204-212.

(6) Smith, Karen F., 1986. "Robot at the Reference Desk?" **College and Research Libraries** 47: pp 486-489.

(7) Alexander, Barbara B., Nancy J. Butkovich and Kathryn L. Taylor, 1986. "Expert System to Assist Technical Writing Students with Library Assignments." A poster session presented at the American Library Association Annual Conference, San Francisco, CA, June 27, 1987.

(8) Butkovich, Nancy J., Kathryn L. Taylor, Sharon H. Dent and Ann S. Moore. "An Expert System at the Reference Desk: Impressions from Users." Work in progress.

4. **Objectives**:

(1) To identify and evaluate expert system software packages and determine which one would be best suited to our needs.

(2) To build a database which would meet the needs of the target audience.

(3) To evaluate costs, both in staff time and in funding, needed for developing and maintaining the database and for training in the use of the system.

(4) To evaluate student and staff response to the software and the database.

5.a. **Hypotheses or research questions**:

(1) Is the expert system sufficiently user-friendly to allow students to use it effectively with minimum instruction?

(2) How much time is required to create and maintain the database?

(3) How will students react to an expert system?

(4) Will the system be flexible enough to allow expansion to applications for

reference questions other than those generated by the Technical Writing students?

b. **Research design**:

The students enrolled in English 301 courses, Technical Writing, will be asked to fill out a form evaluating the software, the database, and the instructions for use.

Library faculty and staff will also be asked for their comments concerning the system, database and instructions.

c. **Methodology**:

The software will be selected using a combination of published reviews and hands-on demonstrations. Discussions with producers will also be included.

Database creation will involve identifying and indexing by title, call number, location, type of source, and broad subject headings. A database built for an earlier test will be used as a base.

Once the system is installed a training program within the Reference Division will be conducted in order to initiate the staff and faculty to the system.

The system will be made available to all students in the Technical Writing classes. The existence of an expert system will be publicized among Technical Writing instructors. Instruction sheets for the system will be available, and students will be surveyed at the end of each search session. The survey form will include questions concerning their level of knowledge of menu-based systems, kinds of materials being sought, and search results. Any staff or faculty member using the system will also be surveyed. Data may be analyzed using a commercially produced statistical package in order to arrive at statistically valid conclusions.

6. **Fund justifications**:

Funds will be required for paper and printing of questionnaires and instruction sheets. Funds are also required for software to serve as the expert system. Expert system shells with natural language capability are more expensive than most other software. Hardware is requested to provide a dedicated machine for the expert system. Ideally, the expert system should be used on a dedicated computer. If necessary, it could be shared by an existing computer in the AIRS area. If hardware is shared, however, this will limit accessibility to patrons. Student hours are requested to build the expert system's database.

Several levels of funding are possible and up to the discretion of the research committee.

	Level I	Level II	Level III
software	$1000	$1000	$1000
paper and printing	25	25	25
literature search for software reviews	40	40	40
student hrs. 4 @ $5/hr.		20	20
printer			305
16-bit CPU (640K bytes)			550
monitor			70
hard disk drive			295
cables			65
Totals	$1065	$1085	$2310

7. **Dissemination of results**:

Information will be gathered on 1)costs involved in the planning and implementation of an expert system, 2)user reactions to an expert system, and 3)problems encountered and plans for the future. Results on all three issues will be presented in a poster session at ALA. At least one article will be prepared for a library journal.

SYSTEMS AND PROCEDURES EXCHANGE CENTER

EXPERT SYSTEMS

ASSOCIATION OF RESEARCH LIBRARIES OFFICE OF MANAGEMENT SERVICES

Index Expert

Purpose:	To identify appropriate indexes and abstracts to meet users' information needs.
Development Tool:	PDC Prolog
Developers:	Charles W. Bailey, Jr., Assistant Director for Systems Jeff Fadell, Information Services Librarian Judy E. Myers, Assistant to the Director Thomas C. Wilson, Head of Systems
Contact:	Charles W. Bailey, Jr. Assistant Director for Systems University Libraries University of Houston Houston, TX 77204-2091 (713) 749-4241 E-Mail: LIB3@UHUPVM1.BITNET
	Judy E. Myers Assistant to the Director University Libraries University of Houston Houston, TX 77204-2091 (713) 749-4241 E-Mail: LIB8@UHVAX1.BITNET

LH University of Houston

University Libraries
4800 Calhoun Road
Houston, Texas 77004

TO: Jeff Fadell
Sandy Maxfield
✓ Judy Myers
Tom Wilson

FROM: Robin Downes RD
Director of Libraries

DATE: January 20, 1988

SUBJECT: Intelligent Reference Systems Project

You are requested to serve on the Intelligent Reference Systems Project. The long-term goal of the project is to explore the application of expert systems, hypertext, and other emerging software tools to the creation of sophisticated software that will help augment the reference function. Judy Myers has been asked to be Project Manager.

Initially, the project team will analyze the requirements for a system to assist library users in locating appropriate reference materials within a well-defined area of the reference collection. Simultaneously, project members will become familiar with three software packages - Guide (a hypertext system), VP-Expert (an expert system shell), and Dan Bricklin's Demo Program (a prototyping tool). After analyzing the system requirements, the project team will choose one of the three software packages to use to implement a preliminary version of the system by August 1, 1988. The project team is not expected to produce a final, working system in this initial effort, but a "first draft" of a system. Overall, this experience will give the project team a perspective on the strengths and weaknesses of the three types of software tools as information delivery mechanisms, and allow the team to make a recommendation as to whether a production version of the prototype system should be created for library users to employ.

Please indicate to me in writing as to whether you will be able to accept this appointment.

cc: Kathleen Gunning
Charles Bailey

Notes from the first five expert system planning meetings
December 1987 - February 10, 1988
Draft

Initial specifications, constraints

Menu driven, not natural language.

But the idea of a thesaurus and authority structure keeps coming up.

Get people to reference sources. Eventually interface with reference text.

Use expert system technology.

Prototype in a narrow domain, but conceptualize the larger problem.

This should be an attractive resource.

The product will probably involve some instruction in the use of tools.

Eventually, the product should lead directly to online searching or searching of local electronic files (CD or other), and to the online catalog and the campus network.

Need to make it user centered--the pre-Copernican (Ptolemaic, (Cartesian?)) model.

The two concepts that must be worked out in order to create a prototype are the internal data structure and the questions to be asked of the users.

Possible name--The Reference Machine, the Reference Engine.

Are we trying to electronify a current process, or to do something entirely new? Current process--but it may look quite different. Also should be more consistent than the current process.

General user interface thoughts

The user needs to know where he is in the system - this is not apparent in Guide, but maybe we could build it in. User's previous decisions should be onscreen, or available at the press of a key. Maybe always onscreen, but abbreviated, expandable by clicking on that word or in that window.

Jumping all the way back may get people lost. May be better to go sequentially back, as escape key does in ERIC and previous screen (should) in Geac. It would be good to do both if we can keep users posted on where they are.

People should have a chance to change individual decisions, not have to reenter the whole search with one change. This option can be presented when bailout is selected, or can be available at any time.

Need a quick path for expert users--Supermenu?

Problems with knowing where you are--if you put a sample search in the system, people mistake it for the real thing.

Another thought on a sample search--example usually not relevant. Use replaceable (user supplied) keywords to make it look more realistic?

Highlight a window and see the next level menu, without having to choose it. Highlight a type of material and see more detail. Highlight a subject and see detailed breakdown.

Approach to the process

We need to work at several levels. We need to think broadly, so that our work in the small area can easily be extended. We will probably alternate several times between thinking at a broad level and a detailed level.

Selecting a prototype area

Select a messy topic or a tidy one?

Doing a messy topic would be better proof that we could do the larger task.

Doing a tidy topic is safer.

We may want to do two prototypes, a tidy one to get the whole thing off the ground, and if we decide that we will need to go for major grant funding, a messy-domain prototype to justify the grant.

Also need to consider our service needs. We may want to select a prototype area on the basis of our own service needs. Referring a user to an appropriate CD Rom or QuickSearch database may be an important service need.

Domain suggestions

Company information

Too narrow.

Doesn't demand development of the top-level interface.

Selecting indexes

About the right scale.

A real need.

An easy area to attempt.

We would need to build in an opportunity to choose journal articles at the top level, and to see how the more specific domains tie in.

Would require development of the top-level outline.

Covers a lot of subjects.

What would we not send people to journals for?

Everything else in the reference collection.

Approach them by subject or as a material type? Both.

"What you want may be compiled in a quick reference source. If not, you need an index."

Wouldn't have to do all of the indexes--50 or 100 of them. Could even develop the prototype completely down only one or two paths.

Reference books

Too big.

Business

Is this too different to be a good example?

Too big?

Literary criticism

Term papers

Doesn't really get to reference materials in a limited subject area.

Physical data

Needed (by staff and users) but not asked as often.

Presentation to user

The quality of the concept of the opening menu will determine the success of the presentation.

By subject? By type of information sought? Give the user a choice to search either way? Or a subject search menu with a bailout?

Ask them what class they're in? (The code name, not "methods"). But does this box them in by criteria we have selected, over which they have no control? And of which they are unaware?

But we are boxing them in. Narrowing based on the information they are giving us.

If we don't call a subject what they would call it, we're boxing them in--into the wrong box.

We need to let the user know what our information model is.

Research indicates that it is more successful to let an expert structure the presentation and explain to the user what the structure is, than to try to tailor a presentation to users preconception. (see the book Interfacing thought)

Need to be able to let the user browse randomly through the data base. But in a useful way. Need to be able to explain this process to users.

Level of need - (popular, scholarly, overview, etc.) - let the user decide--tell them what level the sources that have been retrieved are and let the user select.

It is easy for us to be too didactic about whether a person should use a journal article. We should let the user decide.

Is there a way that we can tell if users are doing something they shouldn't, and steer them right? a) Let them make the decisions. b) Give them an option to say "This is too confusing" or "How did I get here?"--interface with hypertext here?

This is the hard part. Maybe there is no one right way.

A working system must be flexible. But it can't look messy to the user, and it has to quickly get to what they want.

People will sit down and use this machine even if they know it doesn't do what they want (LC experience with Scorpio).

Let's really listen to the questions we get at the desk and see how we can do first-level menu screens that deal with them--people ask for the Gettysburg address, members of the Russian Politburo.

Things a person would notice that would be hard to ask on a computer:

Do you have a purple dittoed sheet? (an assignment)

How slowly (cautiously, fearfully) did you approach this machine?

Examples of presentation to the user

Example 1

Do you want:
1. Popular articles on a topic?
2. Articles on business, or the business aspects of a topic?

etc.

Example 2

What type of presentation do you want?
1. In a popular magazine.
2. In a business magazine.

etc.

Example 3

Do you want
1. Online catalog
2. General information, directions [link to Information Machine]
3. [link to expert system]

Example 4

Are you looking for
1. Information on a subject
2. A certain type of material [a directory, etc.]
3. Are you starting research on a topic?
4. Do you want quick facts? [doesn't everyone?]

Subject presentation

Librarians assume far too much about the user's ability to specify a subject. User may need to focus in on a subject by thinking wide, then narrow, using examples.

Users may miss information due to tunnel vision, we may need to present the broader context, to put it in front of them so they will notice it.

How about multidisciplinary needs?--educational administration

Users may walk right past what they need--look for Barrons and not realize that Petersons does the same thing.

"My teacher said" is one cause of this. How do we deal with this one?

Ask why they're asking--for a term paper, etc.

Type of material presentation

People don't want a handbook. They want information.

Information structures

Tree -- inadequate--need bailouts.
Net--too many laterals can be confusing.
Bush--Medline thesaurus as an example.

Internal data structure

Mostly a table, with a few rules.
When we start to work in a domain, we need to lay out a large table first--to be sure we don't have problems with connections.

Long term thoughts

We want to create something that is extensible to other libraries. To make the whole system more portable, the data in the table should eventually be included in the MARC record, so that the system in each library will refer only to the works available in the local database. This would imply that we put minimal bibliographic info in our records, but include the GSRN or other appropriate link back to GEAC.
When it comes time to seek grants, OCLC might be a possible source.

Likely programming vehicles

For a first-cut demo, probably Dan Bricklin's Demo Program.
VP Expert looks like a good choice for the first level of the decision process.
The second level of the decision process may be the one that leads to CD ROM reference text. We may need to give the user some text to help with the selection of a resource. This is a likely application for Guide.
We aren't sure whether the current hypertext programs are big enough to contain what we want to do. But would probably be suitable for subcomponents.
Guide is a likely vehicle for tutorial information.
Zoomracks is a PC program similar to hypercard--we may want to learn more about it later.

Software interests and strengths

Jeff has demo program cracked
Tom wants to learn dBase
Jeff will talk to Will Porter about Guide
Tom very interested in hypercard

TO: Robin Downes

FROM: Intelligent Reference Systems Committee,
Judy Myers, Chair JM

SUBJECT: Expert System Report and Recommendations

DATE: August 31, 1988

REPORT

The Intelligent Reference Systems Committee has produced three functioning prototypes of an expert system designed to assist library users in the selection of appropriate periodical indexes. One of the prototypes is capable of being expanded to encompass all of the design objectives of the project.

Our broad design considerations were:

-To create an easy-to-use system that would be attractive to the user
-To use expert system technology
-To design a system that could be easily expanded to cover other areas of the reference collection
-To make it easy to revise the data used by the program

We began our design efforts by considering both the user interface and the information structure of the system.

Our research on user interfaces indicated that users have difficulty knowing where they are in an electronic environment. We therefore designed an interface that:

-Lets the user know the effect of making a choice
-Shows a user's prior choices on the screen
-Allows a user to back up to an earlier choice

Once we had in mind the conceptual design of the user interface, Jeff Fadell used the Demo Program software to develop a computer presentation that illustrates the design of the user interface.

Our analysis of the information structure included two components. First, we examined the processes that are used in reference service and discovered query patterns. Next, we analyzed our information resources and found structures and characteristics that can be matched to these query patterns.

We then proceeded to implement these ideas and findings in three expert system environments. In April, Jeff Fadell created a prototype using VP Expert, a rule-based expert system shell. One advantage of VP Expert is that ideas can be developed and tested quickly and easily. The VP Expert prototype was an important step because it validated our system design concepts.

However, we decided that VP Expert would not be suitable for further development work for two reasons. First, we had decided that the best way to store information about indexes and subject headings was in frames. By using a frame-based infor-

mation structure we would be able to reduce the redundancy of the data and would be able to revise the data more easily. Unfortunately, VP Expert does not support frames. Second, VP Expert does not have sufficient graphics capability to implement the user interface that we had designed.

In June we began work on a second prototype using the Intelligence/Compiler, a sophisticated, frame-based expert system shell with a built-in programming language. Our early experiments showed that we could represent our frame-based data structure with the Intelligence/Compiler. However, we found that, while the Intelligence/Compiler has many powerful features, it is difficult to use and its graphics capabilities are limited. This prompted us to investigate the feasibility of using the Turbo Prolog language to create a prototype.

Prolog is a computer language that was designed to support the programming of artificial intelligence and expert systems. Turbo Prolog is a version of Prolog that includes support for sophisticated screen displays. Because it is a programming language instead of a shell, Turbo Prolog allows much more control of the final product, but at a cost--it requires the designer to build the tools first, and only then can the tools be used to create the result.

Following the ALA Annual Conference, we decided to develop prototypes in both the Intelligence/Compiler and Turbo Prolog. At this stage, we were not sure how successful our Turbo Prolog programming efforts would be. We decided to develop two prototypes in parallel so that we could assess the pros and cons of both approaches. By August 31st, Charles Bailey had developed a prototype using the Intelligence/Compiler and Judy Myers had developed a prototype using Turbo Prolog. We feel that both prototypes are a success.

After evaluating both development environments, we recommend using Prolog to create the operational system. The primary reason for this recommendation is that, even though none of the versions of Prolog have the desirable built-in features of the Intelligence/Compiler, Prolog is a more flexible tool that allows us to create the user interface that we feel is needed.

Considering the complexity of the task that we (knowingly) set for ourselves, we think we have made remarkable progress. We would like to have an opportunity for the Committee to meet with you in order to show you what we have done.

PROPOSAL

We still have a considerable amount of work to do to complete and refine the Prolog product so that it can be made available to the public, but it is clear that the task can be accomplished. We therefore propose that the Intelligent Reference Systems Committee be continued, with Charles Bailey added as an official member, so that we can complete the development of the expert system for selecting periodical indexes. We would expect to have a product ready for public use by the beginning of the spring semester. During this period, we would also want to select an additional area of the reference collection and to begin work on it.

TO: Charles Bailey
Jeff Fadell
Judy Myers
Tom Wilson

FROM: Robin Downes
Director of Libraries

DATE: October 17, 1988

SUBJECT: Continuation of the Intelligent Reference Systems Project

Thank you for your informative report, which detailed the significant progress the Intelligent Reference Systems Project has made since its inception. Your expert system prototype development efforts were very impressive. The Project as a whole shows great promise for significantly improving the service offerings of the Library.

I would like the Library to continue this exciting expert system development work. You are requested to serve on the Intelligent Reference Systems Committee, which shall be chaired by Judy Myers. The long-term goal of the Committee shall be to explore the application of expert system technology to the provision of reference services. The immediate goal of the Committee is to develop a pilot version of an expert system to assist users with selecting appropriate indexes and abstracts. The target date for having a pilot version of the system ready for testing by Library users shall be the end of the Spring Recess (March 27, 1989). The system shall be revised as needed during the remainder of the Spring Semester. The target date for final implementation of the production version of the system shall be the start of the first Summer Session (June 5, 1989).

Please indicate to me in writing as to whether you will be able to accept this appointment.

cc: Kathleen Gunning

TO: Intelligent Reference Systems Committee

FROM: Charles Bailey

DATE: March 31, 1989

SUBJECT: Index Expert System

Here is the first version of the Index Expert system, the stand-alone expert system for public use. This system is written in Turbo Prolog. Type "indexexp" to start this system. This system is based on the recent specification change that replaces the subject "box" interface with a menu-driven interface for subject searching. The menu function used for presenting subject categories has no intrinsic limit to the number of categories that can be employed.

The system first displays a introduction screen, and, after the user has pressed any key, begins the subject selection process. At the first subject selection menu, you can exit the system by pressing the escape key. (Pressing escape at subsequent subject menus will now cause a system error. I'll correct this for the next version). As the user moves the cursor to different subject categories in the selection menu (e.g, Social Sciences) the next level of subject categories is displayed in a window at the bottom of the screen (e,g., History Psychology Sociology). The last line of the screen has general directions in a window with no border.

Searching proceeds as in the consultation mode of the Knowledgebase Management System, with one exception. For an aspect search (e.g., history aspect of education), the system will now first show indexes that have complete coverage of the primary subject (e.g., education) and then show indexes that have the appropriate coverage (selective or complete) of the secondary subject (e.g., history). This is consistent with Jeff's Demo program prototype.

Correct operation of Index Expert is predicated on checking the frame and slot files with the Knowledgebase Management System. In the next version of the Knowledgebase Management System , I will incorporate Index Expert as the consultation module.

The next step for developing Index Expert will be to allow the user to go back to prior searches by hitting the escape key. The public version of the system will have no way to exit the system. For the Index Expert version in the Knowledgebase Management System, I will define F10 as the key to exit the Index Expert and return to the Knowledgebase Management System.

TO: Intelligent Reference Systems Committee

FROM: Charles Bailey

DATE: April 5, 1989

SUBJECT: Expert System Upgrades

Enclosed you will find version 1.3 of the Knowledgebase Management System and version 1.1 of Index Expert.

The revised Index Expert system adds the following features:

1. Ability to return to prior subject menus by hitting the escape key. Try going down the subject hierarchy from Science to Computer Science to Expert Systems. Hitting escape at Expert Systems will move you back to Computer Science. Hitting escape again will move you back to the main menu.

2. Ability to return to the top of the subject hierarchy from any lower level subject menu by hitting Home. From Expert Systems you can return to the main menu by hitting Home.

3. Improved display of lower level subject headings in the preview window. Subject headings are separated by commas and the list ends with a period. (Word wrap problems still exist).

4. For staff use, allows exit from the system by hitting the Del key at the main menu. This must be done after the system has displayed the initial window that gives the system name, etc. This feature can be easily eliminated for the public version of the system by deleting a few lines of code.

The revised Knowledgebase Management System removes the code for consulting a knowledgebase from this system and, instead, calls the Index Expert system to perform this function. The same menu choice, "Consult Knowledgebase", is used. You can run the Index Expert system in stand-alone mode by typing "ie".

TO: Intelligent Reference Systems Committee

FROM: Charles Bailey

DATE: April 24, 1989

SUBJECT: Index Expert 1.3

I have given Judy Myers a copy of the new version of Index Expert (version 1.3), which improves memory management in the system. Specifically, this version minimizes the cumulative effects of recursive memory allocation in the subject menu module. Now, moving the cursor within a menu (up, down, PgUp, PgDn) will not result in any permanent memory reduction. There is still a small memory reduction when the user employs the Esc or Home features; however, once a subject selection is made, all memory is released.

TO: Intelligent Reference Systems Committee

FROM: Charles Bailey

DATE: April 10, 1989

SUBJECT: Index Expert 1.2

Enclosed you will find version 1.2 of Index Expert. This version implements the following changes that Judy requested:

(1) The decision to display and act on the level prompt (i.e., comprehensive or selective) will be determined by the primary search term (e.g., you search for Education, indicate that you want to see related aspects of Education, and choose Psychology; the program will display the level prompt based on whether Education has both a comprehensive and a selective index).

(2) If the user picks a level and no corresponding index exists at this level for the aspect, the system will display indexes for that aspect that are at the other level (e.g., you choose comprehensive, but there is no comprehensive Psychology index; the system displays any selective Psychology indexes with the warning: "Not a Comprehensive Index, But Also Useful."

Enclosed you will also find a test batch file (test.bat) that uses nine test slot files. Each slot file contains a maximum of 4 indexes:

Education

ERIC -- Comprehensive
Education Index (EI) -- Selective

Psychology

Psychological Abstracts (PA)-- Comprehensive
General Psychology Index (GP) -- Selective

The 9 files contain the following values:

1. ERIC, EI, PA, GP
2. ERIC, EI, PA, -
3. ERIC, EI, -, GP
4. ERIC, -, PA, GP
5. ERIC, -, PA, -
6. ERIC, -, -, GP
7. -, EI, PA, GP
8. -, EI, PA, -
9. -, EI, -, GP

To start testing, type "test". The batch file will load the first test case and execute Index Expert. To exit a test, hit Del at the first subject menu screen after the system identification screen. The batch file will load the next test case and execute Index Expert.

TO: Intelligent Reference System Committee
FROM: Judy Myers
RE: Index Expert 1.4
DATE: April 24, 1989

I have combined the two upgrades that were made over the weekend by Charles and myself. The current version has a user help window above the menus on the subject selection screens. It also asks if users want a more specific subject. An additional revision is that subjects that do not have a lower level list may have an individually tailored message that describes the effect of making the choice. See the message for "General" for an example. In combining the two sets of revisions, I lost the default message for subjects that do not have a lower level, but I expect this to be easy to reinstate. There may be bugs in this combined version. I have not tested it thoroughly because I wanted to get it out as soon as possible so that you will have a chance to look at it before our meeting tomorrow.

The upgrade to the program and the frames is installed on System 61, in D:test. To run it, at that prompt type "IE."

Here is an initial list of potential revisions and enhancements to the program and the knowledge base, to facilitate our discussion tomorrow.

Program

Expected to be easy to do:
- Review and revise text of screen messages
- Add header

Slightly harder to do:
- Put box around user help (running out of lines on screen)
- Put up box when it is possible to back up
- Add a preview box for aspects
- Add appropriate user help boxes to all choice screens

May be hard to do:
- Use of Escape to back up at any point

Difficulty unknown:
- Put commas in subject heading list of results
- Add word breaks to display in preview box
- Deal with longmenu jumping to 10 lines instead of 8 when PgUp is pressed (if we can keep this from happening we can recover some lines to be used as a border for user help)

Knowledge base:
- Add more indexes
- Add notes and other messages
- Add preview-box messages as desired
- Add spaces so that content will line up (\t does not work)

TO: Intelligent Reference Systems Committee

FROM: Charles Bailey

DATE: May 11, 1989

SUBJECT: Index Expert 1.5

I have given Judy Myers a copy of Index Expert 1.5 to install on the IS development computer. I recommend that we put this version out for public testing.

Version 1.5 expands and stabilizes the improvements made by Judy to version 1.4 in an interim, unnumbered version, which was shown to us in our last Committee meeting. The major differences between version 1.5 and the unnumbered interim version are as follows:

1. Window use has been stabilized so that windows are added, deleted, and displayed correctly, preventing system crashes. The double windows previously used to improve the appearance of some menus have been removed and replaced by single windows that achieve the same effect.

2. General user instructions have been added to all screens that did not have them. An additional window explaining the difference between a selective and a comprehensive index has been added to the screen where that choice is made.

3. A system ID window has been added at the top of the screen.

4. The text of many windows and prompts have been changed to reflect wording suggested by Jeff Fadell.

5. Use of Esc and Home keys has been disabled in all menus except the initial subject selection menus. The End key has been disabled everywhere.

TO: Intelligent Reference Systems Committee

FROM: Charles Bailey

DATE: May 16, 1989

SUBJECT: Index Expert 1.6

I have given Judy Myers a copy of version 1.6 of the Index Expert System. As we agreed, this version of the system will be put out for public testing today.

This version makes the following changes to version 1.5:

1. A user help window has been added to the search results screen.

2. A new print menu has been added after the search results screen, which allows the user to print all retrieved indexes. The system will form feed the printout twice, freeing the user from having to form feed the printout manually. If the printer is offline during a print request, the system will stop until the printer is put online.

3. A search log has been created, which records the primary subject and related aspect (if any) of each search in delimited form. This ASCII file is called history.txt. It must not have an end-of-file marker. A second file, history.new, can be used to reset searches. To do this, copy history.txt to floppy disk to save the old search results, delete history.txt on the hard disk, and copy history.new to history.txt.

4. The text of the related aspects window was colored yellow.

TO: Knowledge Engineering Group

FROM: Charles Bailey

DATE: 4/30/90

SUBJECT: Index Expert 1.9

The following changes have been made to Index Expert:

(1) If there is only one aspect, the user will not be asked to select of that aspect twice on two consecutive menus.

(2) Log entries are date-stamped. The new log entry format is "Subject","Aspect","Month/Day/Year".

(3) The RESET.BAT file has been changed. There are now two log files retained on disk.

The use of the history files is as follows:

HISTORY.TXT - Contains the current log file.

HISTORY0.TXT - Contains a single dummy line to start a new log file.

HISTORY1.TXT - Contains the last log file saved.

HISTORY2.TXT - Backup file that contains the log file that preceded HISTORY1.

I suggest we install the new version of the system tomorrow. To do so, simply copy the current HISTORY.TXT to a floppy disk, erase all files on the public unit, copy the new files to that unit, and add any special files to stop reboot, etc.

RESET should be run monthly. To understand RESET, let's go to December 1, 1990. This is what will happen when you type RESET on that date.

(1) HISTORY2.TXT (September's data) will be erased.

(2) HISTORY1.TXT (October's data) will replace HISTORY2.TXT.

(3) HISTORY.TXT (November's data) will replace HISTORY1.TXT.

(4) HISTORY0.TXT (dummy data) will replace HISTORY.TXT.

You would copy HISTORY1.TXT on floppy disk and give it to me to process November's statistics.

Index Expert 1.9 (C) Copyright 1990 University of Houston Libraries

INDEX EXPERT

Looking for articles on your topic?

The articles you need will be listed in periodical indexes.

INDEX EXPERT will help you choose the right indexes.

INDEX EXPERT can give you the names of appropriate indexes, their location, and some information about them. You can then go to the recommended indexes and look up your topic to find a list of articles. INDEX EXPERT does not provide direct online access to the indexes themselves or to journal citations or articles.

To begin press the space bar.

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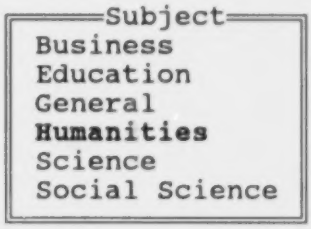
Use the up and down arrow keys to highlight your choice.
Then use the Enter key to select it.



Humanities includes such subjects as Archaeology, Architecture, Art, Classics, Communication, Dance, Film, Folklore, History, Journalism, Linguistics, Literature, Music, Performing Arts, Philosophy, Poetry, Radio and Television Programs, Rhetoric, Theater, Theology, etc.

Index Expert 1.9 (C) Copyright 1990 University of Houston Libraries

Articles in most Humanities topics will be listed in indexes that cover Humanities in general. In addition, the Humanities areas listed in the box below have their own specialized indexes.

Would you prefer to use an index for one of the more specific subjects listed below?

Yes
No

Architecture, Art, Classics, Communication, Drama, Folklore, History, Linguistics, Literature, Music, Philosophy.

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There are too many menu items to display all of them at once.
To see the other menu items, use the arrow keys, PgDn, or PgUp.
Press the Enter key to select an item.

Subject
- Architecture
- **Art**
- Classics
- Communication
- Drama
- Folklore
- History
- Linguistics

Art includes such subjects as Sculpture, Drawing, Painting, Printmaking, Photography, Decoration and Functional Design, Crafts, Graphic Arts, Art History, Museology, etc.

Index Expert 1.9 (C) Copyright 1990 University of Houston Libraries

Articles in most Art topics will be listed in indexes that cover Art in general. In addition, the Art areas listed in the box below have their own specialized indexes.

Would you prefer to use an index for one of the more specific subjects listed below?

Yes
No

Film, Photography, Video.

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Use the up and down arrow keys to highlight your choice.
Then use the Enter key to select it.

Do you want a related aspect listed in the box below?

Yes
No

Related Aspects for Art

Business, Teaching.

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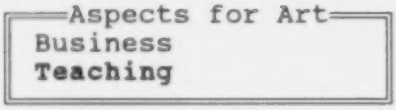
Use the up and down arrow keys to highlight your choice.
Then use the Enter key to select it.



Index Expert 1.9 (C) Copyright 1990 University of Houston Libraries

Use the up and down arrow keys to highlight your choice.
Then use the Enter key to select it.

Do You Need:
A selective index
A comprehensive index

A SELECTIVE index is good for finding a few good articles quickly. It covers the principal journals in a field.

A COMPREHENSIVE index is used for extensive research. It covers the majority of the journals in a field.

Use arrow keys and PgDn key to see the remainder of the list.
Press F10 when done. Then you can print the list of indexes.

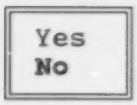
For articles in Art journals, use these indexes:

Index: Art Index
Location: Index Table 13
Subject: Architecture Art
Scope: Selective
Note: This is a one-step index. Citations to articles appear immediately following subject headings.

For articles in Teaching journals, use these indexes:

Index: Education Index
Location: Index Table 5
Subject: Education Teaching
Scope: Selective
Note: Indexes the major Education journals.
Note: This is a one-step index. Citations to articles appear immediately following subject headings.

Would you like to print a list of the indexes you have just seen?



ASK BART!

Purpose:	To direct researchers to appropriate reference sources in their fields of study, initially anthropology.
Development Tool:	VP-Expert (although we are converting to KnowledgePro)
Developers:	Barton Clark, Professor of Library Administration / Director, Departmental Library Services Mary Beth Allen, Assistant Professor of Library Administration / Acting Head, Applied Life Studies Library Andy Boze, Assistant Professor of Library Administration / Computer Applications Librarian
Contact:	Barton Clark Departmental Library Services 246a Library University of Illinois 1408 W Gregory Dr Urbana, IL 61801 (217) 333-0317 E-Mail: AXXBART@UICVMC

ASK BART!
Bibliographic Area Research Tool
ABOUT
Anthropology
HRAF
Psychology
The_Meaning_of_Life
Welcome to the Education & Social Science Library and to the Scholars' Workstation. To use or learn about any of the above systems, use the mouse to click on your choice.

The Anthropology Advisor will guide you to other library tools and to important information sources in the REFERENCE COLLECTION of the Education and Social Science Library. As you consult the expert system, you will identify what subject and geographic areas your research involves, and what kind of information (general or in-depth) you need to complete your research.

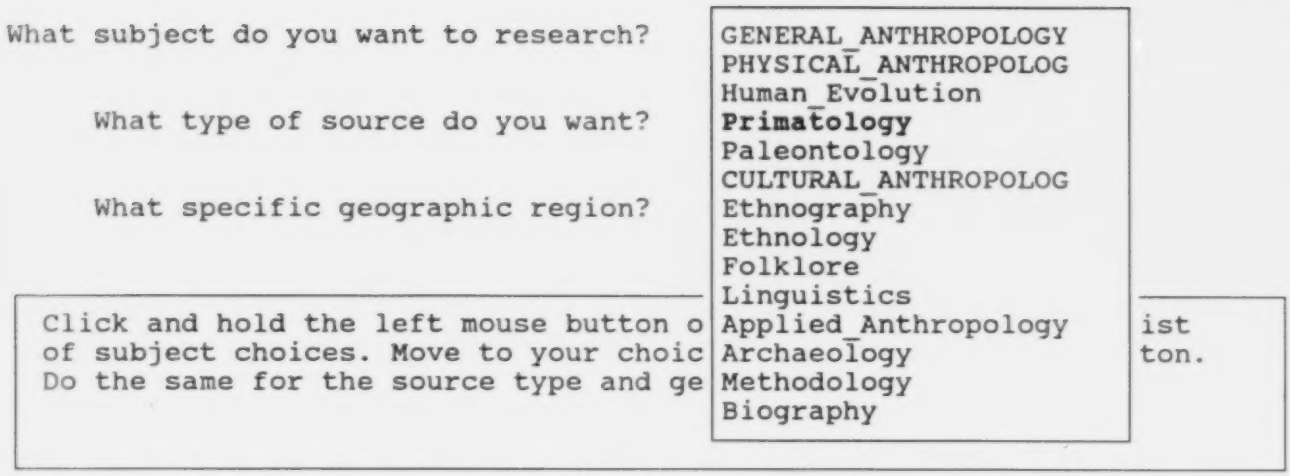
Continue

What subject do you want to research? _

What type of source do you want? _

What specific geographic region? _

Click and hold the left mouse button on the top-most box for a list of subject choices. Move to your choice and release the mouse button. Do the same for the source type and geographic region boxes.


What subject do you want to research?
What type of source do you want?
What specific geographic region?
GENERAL_ANTHROPOLOGY
PHYSICAL_ANTHROPOLOG
Human_Evolution
Primatology
Paleontology
CULTURAL_ANTHROPOLOG
Ethnography
Ethnology
Folklore
Linguistics
Applied_Anthropology
Archaeology
Methodology
Biography
Click and hold the left mouse button o
of subject choices. Move to your choic
Do the same for the source type and ge
ist
ton.

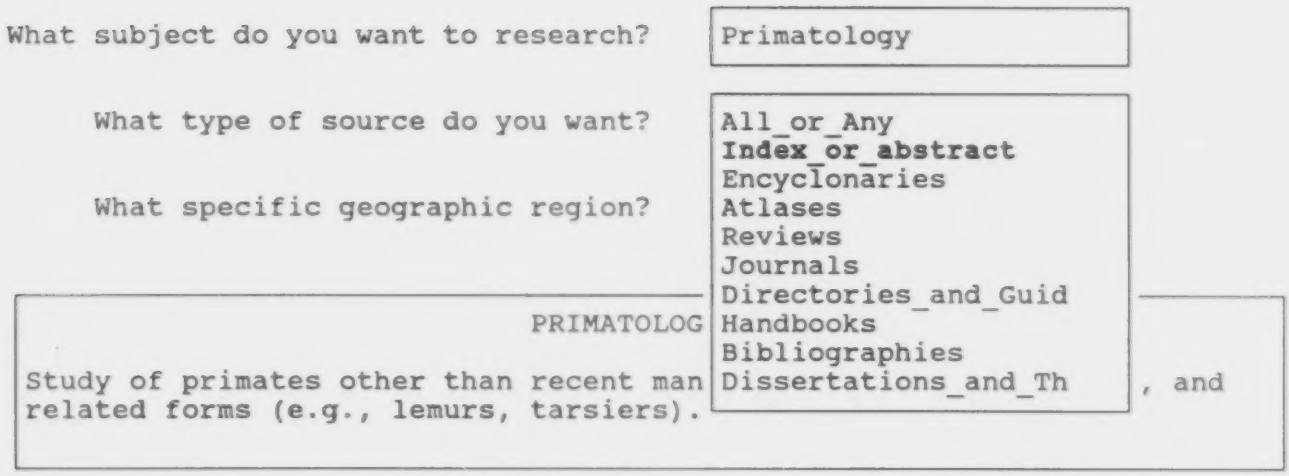
What subject do you want to research? Primatology

What type of source do you want? _

What specific geographic region? _

PRIMATOLOGY

Study of primates other than recent man, especially apes, monkeys, and related forms (e.g., lemurs, tarsiers).


What subject do you want to research?
Primatology
What type of source do you want?
What specific geographic region?
All_or_Any
Index_or_abstract
Encyclonaries
Atlases
Reviews
Journals
Directories_and_Guid
Handbooks
Bibliographies
Dissertations_and_Th
PRIMATOLOG
Study of primates other than recent man
related forms (e.g., lemurs, tarsiers).
, and

What subject do you want to research? Primatology

What type of source do you want? Index_or_Abstract

What specific geographic region? _

INDICES & ABSTRACTS

Lists, usually in alphabetical order, arranged by topic and providing access points (citations) to particular works (usually journal articles). An abstract also contains a summary of a work.

What subject do you want to research? Primatology

What type of source do you want? Index_or_Abstract

What specific geographic region?

All_or_Any
Africa
Asia
Europe
Middle_East
North_America
Oceania
South_America
Soviet_Union

INDICES &

Lists, usually in alphabetical order, a
access points (citations) to particular
An abstract also contains a summary of

ding
ticles).

What subject do you want to research? Primatology

What type of source do you want? Index_or_Abstract

What specific geographic region? Oceania

OCEANIA

Insular Pacific, as well as areas like Australia, Indonesia, Taiwan, and the Philippines.

Continue

Next | Back | New_Search | Print | Print_All | Quit

Bart found 9 citations ... just a moment

Next | Back | New_Search | Print | Print_All | Quit | 1 of 9

Q.016.913	Harvard University. Catalogue of the Library of the Peabody Museum of Archaeology and Ethnology. Authors. 26 vols + supps. 1963-79.
Q.016.913	_____. Subjects. 27 vols.+ upps. 1963-79.

For many years, the definitive bibliography of anthropological writings. Especially valuable for references to periodical articles, festschriften and proceedings of congresses. The four supplements cover additions to the collection through 1977. Includes an index to subject headings. See preceding entry for update.

L'AQUA

Development Tool:	1st Class
Developers:	Susan Hocker
Contact:	Stanley Wilder Troy H. Middleton Library Louisiana State University Baton Rouge, LA 70803 (504) 388-2217

Welcome to L'AQUA

L'AQUA is an expert advisor to the published literature dealing with AQUACULTURE. Species include those common to Louisiana and adjacent states. Answers consist of citations to appropriate books, journals, documents or, in some cases, state agencies to becontacted for additional information.

SYSTEM REQUIREMENTS:

An IBM Compatible computer with at least one disk drive
64K memory
DOS 2.0 or greater.

STARTING THE PROGRAM:

After starting your system using DOS
Insert L'AQUA disk in Drive A
Type LA, press enter.

RUNNING THE ADVISOR:

Use the arrow keys to move among choices.
Use the enter key to select an item.
PgDn key will take you to the second screen
(if more than one is available)
Press F2 at any point for HELP.

AT END OF SESSION:

You may press R to RERUN the advisor.
You may press P to receive a printed listing of your choices and the citations listed. (You must have a printer attached).

REMEMBER:

Complete the session and press Q to Quit
BEFORE REMOVING L'AQUA DISK FROM YOUR COMPUTER.

Produced by Susan Hocker, Louisiana State University Libraries

TYPICAL PRINTED REPORT OF A SESSION SEARCHING FOR A SPECIES.

WELCOME TO L'AQUA

This Advisor is designed to lead you to information published in books, journal articles or extension publications dealing with AQUACULTURE in Louisiana and adjacent states. It also includes a listing of state and federal agencies dealing with aquaculture.

produced by

Susan E. Hocker
Louisiana State University
Libraries
Baton Rouge, La. 70803
September 1988

Introductory Screen

Please choose the Aquaculture SUBJECT OF INTEREST from the list below using the arrow keys.

* General information on aquaculture. *LIST OF POSSIBLE CHOICES*
* Chemicals (for water, disease control etc.)
* Information on specific species.
* Weeds and weed control.
* Additional sources of information at the State and Federal level.

==> Information on specific species. *Choice*

SUBJECT CHOICE SCREEN

Please choose the Aquaculture SPECIES OF INTEREST from the list below using the arrow keys.

* Alligator. *list of species available*
* Bullfrog (Rana catesbeina).
* Channel Catfish (Ictalurus punctatus).
* Blue Crab (Callinectes sapidus).
* Crawfish (Procambarus clarkii, Procambarus acutus acutus, Oronectes, etc.)
* Grass carp (Ctenopharyngodon)
* American oyster (Crassostrea virginica).
* Redfish (Sciaenops ocellata, also called Red Drum or Channel Bass).
* Shrimp or Prawns (Macrobrachium rosenbergii).
* Golden shiners (Notemigonus crysoleucas).
* Tilapia

==> Redfish (Sciaenops ocellata, also called Red Drum or Channel Bass).
species choice

species choice screen

Please choose the TYPE OF INFORMATION needed from the list below using the arrow keys.

* Bibliography.
* Research. *list of choices*

==> Research.
choice

TYPE OF INFORMATION SCREEN

Please choose the SUBJECT OF INTEREST from the list below using the arrow keys.

* Culture.
* Diseases.
* Feeding. *list of choices*
* Fingerlings, larva.
* Harvest.
* Marketing and finance.
* Ponds and site selection.
* Water.

==> Culture. *choice*

SECOND SUBJECT CHOICE SCREEN

You may wish to try the following:

MANUAL ON RED DRUM AQUACULTURE. Preliminary draft of invited papers presented at the Production Shortcourse of the 1987 Red Drum Aquaculture Conference on 22-24 June, 1987. Corpus Christi, Tx. Texas Agricultural Extension Service, 1987.
--or--
REDFISH: Hearing before the Subcommittee on Fisheries and Wildlife Conservation and the Environment of the Committee on Merchant Marine and Fisheries, House, 99th Congress, 2nd Session on HR4690, June 2, 1986.
--or--
Preliminary investigations into red drum culture in Louisiana. Thomas, R.G., Wolters, W.R. LOUISIANA AGRICULTURE v30(1):10-11, 1987?
--or--
Texas A&M studies redfish aquaculture. Robinson, E.H., Stickney, R.R. AQUACULTURE MAGAZINE v8(5):38-9, 1982.
--or--
This issue: Red Drum aquaculture status. COASTAL AQUACULTURE v3(3):1-19, 1986.
--or--
Why choose redfish? Chamberlain, G.W., McCarty, G. AQUACULTURE MAGAZINE v11) (2):35-42, 1985.
--or--
RECENT PROGRESS IN THE DEVELOPMENT OF CULTURE TECHNIQUES FOR REDFISH. (SCIAENOPS OCELLATA). Hopkins, J.S., Smith, T., Stokes, A.D., Sandifer, P.A. Bluffton, SC, Waddell Mariculture Center; 198?
--or--
For additional information see AQUATIC SCIENCES AND FISHERIES ABSTRACTS located in the Library's Reference Department.

ADVISE SCREEN

EXAMPLES SCREEN

	Subject	*Category*	*Result*	*Weight*
=>	species	redfish	#redfsh	1.00
	species	crawfish	#crawfish	1.00
	species	catfish	#cat	1.00
	species	crabs	#crab	1.00
	General	*	potent	0.20
	General	*	gen	0.20
	General	*	add	0.20
	species	shrimp	#shrimp	1.00
=>	weed	*	grass4	0.15
	weed	*	grass3	0.15
	weed	*	grass2	0.15
	weed	*	grass1	0.15
	weed	*	weed	0.20
	weed	*	add	0.05
	species	Bullfrog	frog	0.70
	species	Bullfrog	add	0.20
	species	Alligator.	add	0.20
	species	Alligator.	gator	0.35
	species	Alligator.	potential	0.35
	sources	*	#source	1.00
	chemicals	*	chem	0.50
	chemicals	*	add	0.05
	species	shiners	add	0.10
	species	shiners	potential	0.50
	species	oyster	add	0.05
	species	oyster	potential	0.50
	species	oyster	oys3	0.10
	species	oyster	oyst1	0.10
	species	oyster	oyst2	0.10
	species	Tilapia	til1	0.15
	species	Tilapia	add	0.05
	species	Tilapia	til2	0.15
	species	Grasscarp	grass1	0.15
	species	Grasscarp	grass2	0.15
	species	Grasscarp	grass3	0.15
	species	Grasscarp	grass4	0.15
	species	Grasscarp	grass5	0.15
	species	Grasscarp	add	0.05
	species	Grasscarp	til2	0.15

eg. for Subject=species and Category=redfish Result is chain to Redfsh Knowledge base.

eg. for Subject=weed and any Category Results are weighted to control the order of appearance

```
Rule for knowledge base LAQUA              12:20 pm   4/03/1990

---- start of rule ----
Subject??
 ├General:──────────────────────────────────────────potent
          & - - - - - - - - - - - - - - - - - - - - - gen
 ├chemicals:────────────────────────────────────────chem
 ├species:Species??
           ├Alligator.:──────────────────────────────gator
           │           & - - - - - - - - - - - - - - potential
           ├Bullfrog:────────────────────────────────frog
           ├catfish:─────────────────────────────────#cat
           ├crabs:───────────────────────────────────#crab
           ├crawfish:────────────────────────────────#crawfish
           ├Grasscarp:───────────────────────────────grass2
           │          & - - - - - - - - - - - - - - -grass3
           │          & - - - - - - - - - - - - - - -grass4
           │          & - - - - - - - - - - - - - - -grass5
           │          & - - - - - - - - - - - - - - -grass1
           │          & - - - - - - - - - - - - - - -til2
           ├oyster:──────────────────────────────────potential
           │       & - - - - - - - - - - - - - - - - oyst2
           │       & - - - - - - - - - - - - - - - - oyst1
           │       & - - - - - - - - - - - - - - - - oys3
           ├redfish:─────────────────────────────────#redfsh
           ├shrimp:──────────────────────────────────#shrimp
           ├shiners:─────────────────────────────────potential
           └Tilapia:─────────────────────────────────til2
                    & - - - - - - - - - - - - - - - -til1
 ├weed:──────────────────────────────────────────────weed
      & - - - - - - - - - - - - - - - - - - - - - - -grass2
      & - - - - - - - - - - - - - - - - - - - - - - -grass3
      & - - - - - - - - - - - - - - - - - - - - - - -grass4
      & - - - - - - - - - - - - - - - - - - - - - - -grass1
 ├sources:─────────────────────────────────────────#source
 ├other:───────────────────────────────────────────#interest
 └add:─────────────────────────────────────────────#add
---- end of rule ----
```

Biographical Reference Source Advisor

Purpose:	To collect and provide access to all science-related biographical sources in any library on campus. Designed to augment the expertise of professional librarians as well as to provide minimal access to these sources when no professional librarians are available.
Development Tools:	VP-Expert
Developers:	Lloyd Davidson and Peter Schneider
Contact:	Lloyd A. Davidson Seeley G. Mudd Library for Science and Engineering Northwestern University Evanston, IL 60208. 708-491-2906 (Voice) 708-491-4655 (Fax) E-Mail: Internet (preferred): LDavids@Casbah.acns.nwu.edu ALANET: NW.LD DIALMAIL: 18668 Compuserve: 72260, 1004

The
Northwestern Univerisity

BIOGRAPHICAL REFERENCE SOURCE ADVISOR

Written in VP-EXPERT
by
Peter Schneider

(C) copyright 1989

(Press any key to begin)

The following consultation will help you to select a reference source for biographical information.

To make a menu selection move the lightbar to the option you want by moving the cursor keys and then press either ENTER (if only one selection is allowed) or the ENTER key followed by the END key (if multiple selections are allowed).

When descriptive text is displayed hit P to print it or ESC to go to the next descriptive text or to begin again.

(PRESS ANY KEY TO CONTINUE)

Which of the following fields does the person work in?

chemistry	biochemistry	all sciences
astronomy	civil engineering	physics
biology	chemical engineering	elect engnr/comp sci
mech engineering	engineering	chem engineering

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

Which of the following fields does the person work in?

chemistry	biochemistry	all sciences ◂
astronomy	civil engineering	physics
biology	chemical engineering	elect engnr/comp sci
mech engineering	engineering	chem engineering

Is the person in academia or industry?

Academia	Industry

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

Which of the following fields does the person work in?

chemistry	biochemistry	all sciences ◄
astronomy	civil engineering	physics
biology	chemical engineering	elect engnr/comp sci
mech engineering	engineering	chem engineering

Is the person in academia or industry?

Academia ◄	Industry

Is the person very well known or less well known?

Very	Less	Unsure

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

```
Which of the following fields does the person work in?
 chemistry                biochemistry              all sciences ◄
 astronomy                civil engineering         physics
 biology                  chemical engineering      elect engnr/comp sci
 mech engineering         engineering               chem engineering


Is the person in academia or industry?
 Academia ◄               Industry

Is the person very well known or less well known?
 Very                     Less                      Unsure ◄

Are you looking for general biographic information or directory
type (name and address) information?
 Biographic               Directory
```

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

```
Which of the following fields does the person work in?
 chemistry                biochemistry             all sciences ◄
 astronomy                civil engineering        physics
 biology                  chemical engineering     elect engnr/comp sci
 mech engineering         engineering              chem engineering


Is the person in academia or industry?
 Academia ◄               Industry

Is the person very well known or less well known?
 Very                     Less                     Unsure ◄

Are you looking for general biographic information or directory
type (name and address) information?
 Biographic ◄             Directory

Approximately when did the person begin working in the field?
 Pre 1900                 1900-1950                1950-1970
 1970-present
```

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

```
 biology                    chemical engineering     elect engnr/comp sci
 mech engineering           engineering              chem engineering


Is the person in academia or industry?
 Academia ◄                 Industry

Is the person very well known or less well known?
 Very                       Less                     Unsure ◄

Are you looking for general biographic information or directory
type (name and address) information?
 Biographic ◄               Directory

Approximately when did the person begin working in the field?
 Pre 1900                   1900-1950                1950-1970
 1970-present ◄

Where does the person live?
 America                    Britain                  Europe
 Soviet Union               other
```

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

```
Is the person in academia or industry?
 Academia ◄                Industry

Is the person very well known or less well known?
 Very                      Less                      Unsure ◄

Are you looking for general biographic information or directory
type (name and address) information?
 Biographic ◄              Directory

Approximately when did the person begin working in the field?
 Pre 1900                  1900-1950                 1950-1970
 1970-present ◄

Where does the person live?
 America ◄                 Britain                   Europe
 Soviet Union              other

In which library(s) do you want to search?
 Tech                      Main                      Both
```

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

```
type (name and address) information?
 Biographic ◄              Directory

Approximately when did the person begin working in the field?
 Pre 1900                  1900-1950                 1950-1970
 1970-present ◄

Where does the person live?
 America ◄                 Britain                   Europe
 Soviet Union              other

In which library(s) do you want to search?
 Tech ◄                    Main                      Both

This is a list of the resources in our library that meet your criteria:
all sciences, , Academia, Unsure, 1970, America, Tech

Which of the following possible sources would you like more information about?

 Am Men & Women Sci        Biog Dictnry of Sci       Modern Sci and Engrs
 Prominent Scientists      Women in Science

↑ ↓ →    Enter to select   END to complete    /Q to Quit   ? for Unknown
```

```
type (name and address) information?
 Biographic ◄              Directory

Approximately when did the person begin working in the field?
 Pre 1900                  1900-1950                 1950-1970
 1970-present ◄

Where does the person live?
 America ◄                 Britain                   Europe
 Soviet Union              other

In which library(s) do you want to search?
 Tech ◄                    Main                      Both

This is a list of the resources in our library that meet your criteria:
all sciences, , Academia, Unsure, 1970, America, Tech

Which of the following possible sources would you like more information about?

 Am Men & Women Sci ◄      Biog Dictnry of Sci ◄     Modern Sci and Engrs ◄
 Prominent Scientists      Women in Science
```

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

Modern Scientists and Engineers 1980 <
Tech Reference L509 M147 <
<
Biographies of recipients of major scientific and technologic awards from <
1920 to 1978. <

PgDn, PgUp, ScrollLock to browse | Home to top | Esc to quit | P to print

American Men and Women of Science
Tech Reference L509 A512

Vital Statistics, education, career history, research interests, and mailing addresses of scientists and engineers working in the U.S and Canada. Includes index by field of research. 8 volumes.

PgDn, PgUp, ScrollLock to browse | Home to top | Esc to quit | P to print

Science and Engineering Index Selector

Purpose:	To provide minimal assistance to patrons when professional librarians are not available. Selects groups of relevant indexes based on broad subject categories and gives a brief description of each. Not useful for professional librarians.
Development Tools:	VP-Expert
Developers:	Lloyd Davidson and Peter Schneider
Contact:	Lloyd A. Davidson Seeley G. Mudd Library for Science and Engineering Northwestern University Evanston, IL 60208. 708-491-2906 (Voice) 708-491-4655 (Fax) E-Mail: Internet (preferred): LDavids@Casbah.acns.nwu.edu ALANET: NW.LD DIALMAIL: 18668 Compuserve: 72260, 1004

The
Northwestern University

SCIENCE AND ENGINEERING INDEX SELECTOR

Written in VP-EXPERT by:
Lloyd Davidson
and
Peter Schneider

(Copyright)

(Press any key to begin the consultation.)

The following consultation will help you select an index or indexes for information on specific topics.

You will be asked about the subject you are interested in and the format in which you would like it (Journal articles, for example, or books).

To make a menu selection move the lightbar to the option you want by using the cursor keys and then press either ENTER (if only one selection is allowed) or the ENTER key followed by the END key (if multiple selections are allowed).

When descriptive text is displayed hit P to print it or ESC to go to the next descriptive text or to begin again.

(PRESS ANY KEY TO CONTINUE)

What subject do you need information about?

List All Indexes	Alloys	All Sciences
Analytic Chem	Applied Sci	Astronomy
Biology Gen	Biology Reprod	Biology Zool
Ceramics	Chemistry	Computers
Earth Sci	Ecology	Electronics
Energy	Engineering	Environment
Ergonomics	Materials Sci	Mathematics
Mechanics	Medicine	Metals
Operations Res	Physics	Surface Waves
Aerospace		

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

8 ½

What subject do you need information about?

List All Indexes	Alloys	All Sciences
Analytic Chem	Applied Sci	Astronomy
Biology Gen	Biology Reprod	Biology Zool
Ceramics	Chemistry	Computers
Earth Sci	Ecology	Electronics
Energy	Engineering ◂	Environment
Ergonomics	Materials Sci	Mathematics
Mechanics	Medicine	Metals
Operations Res	Physics	Surface Waves
Aerospace		

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

55

What Format do you want the information in?

[Select as many as you want with the ENTER key, then end the selection process with an END key entry.]

Journal Articles ◄	Books & Journ Titles ◄	Rpts|Conf Proc|Pats ◄
Reviews	Dissertations	Translations

↑ ↓ → Enter to select END to complete /Q to Quit ? for Unknown

Rpts|Conf Proc|Pats
Books & Journ Titles
Journal Articles
on the subject Engineering can be found in the following:

Which ones would you like to see a description of?
[Select as many as you want with the CURSOR ARROWS & ENTER key,
then end the selection process with an END key entry.]

Appl Mechanics Rev	App Science & Techn	Books In Print
Dir of Publ Proceed ◂	Engineering Indx ◂	Index to IEEE Pubs ◂
Indx to Sci Rev-SCI	Med Electr & Commun	Science Cit Indx ◂
LUIS-Online Catalog		

↓ → Enter to select END to complete /Q to Quit ? for Unknown

SCIENCE CITATION INDEX

An international interdisciplinary index to the literature of Science, Medicine, Agriculture, Technology and the Behavioral Sciences. Approximately 3,300 major journals and a few monographic series are indexed. The scope of this index is very broad but the number of journals covered is relatively small compared to the more specialized indexes such as Chemical Abs, Engin Index, Bio Abs and so forth.

Indexes include:

- CITATION: An index to all earlier papers cited by the papers indexed in the SOURCE index. Valuable method of finding papers continuing research on a topic published on in previous years.
- PATENT CITATION: An index to citations to previously published patents.
- SOURCE: An author index to all of the articles indexed.
- CORPORATE: Index to the institution from which the source items originated (e.g. Northwestern)

This database, from 1986 to the present, is now available on CD-ROM. Inquire at the Circulation Desk. It is faster and easier to use on CD-ROM than in the printed version.

PgDn, PgUp, ScrollLock to browse | Home to top | Esc to quit | P to print

ENGINEERING INDEX

World coverage of all engineering disciplines. Journals, technical reports, monographs, conference proceedings, directories and other material. Starting in 1989, includes conference literature; abstracts of conference papers and overall abstracts of the proceedings volume. A listing of material covered is found in PIE, Publications Indexed for Engineering.

All contents available online in COMPENDEX. Ask a reference librarian for more information. Available after 6 for $24/hour. During day for $100/hour.

Main subject headings list can be found in SHE: Subject Headings for Engineering.

Abstracts grouped under major subject headings. Annual author and subject indexes give annual abstract number. (Abstracts are rearranged and renumbered for annual accumulations.)

PgDn, PgUp, ScrollLock to browse | Home to top | Esc to quit | P to print

DIRECTORY OF PUBLISHED PROCEEDINGS

Bibliography citing preprints and published proceedings of congresses, conferences, summer schools, symposia, meetings and seminars that have taken place worldwide from 1964 to date.
Includes indexes to:
- Subject/Sponsor
- Location
- Editor
- Publishers and addresses listing

Each volume contains a significan number of listings to older conferences.

Typical entry (atypical subject):

```
6/88-0450 Lincoln, NE, USA     {Date of conference-Accession no.; Location}
          UFO Symp., MUFONS 19th Annual (Abductions & the E.T.
          Hypothesis)          {Name of conference}
          Sp: Mutual UFO Network (MUFON)    {Sponsoring Organization(s)}
          Ed: Walter H. Andrus, Jr. & Richard H. Hall    {Editors}
          Pub: Mutual UFO Network     {Publisher}
          $15.00 1988 241p.     {Data for acquisition}
          De: Unidentified Flying Objects    {Additional descriptors}
          De: Extraterrestrial (ET)
```

PgDn, PgUp, ScrollLock to browse ▌ Home to top ▌ Esc to quit ▌ P to print

Expert Systems at the Seeley G. Mudd Library for Science and Engineering

By Lloyd A. Davidson

The expert system index selector program is primarily designed to give guidance to patrons when no professional reference staff are available. Since our library only provides professional reference support from 9 until 5 PM, Monday through Friday, while it is open until midnight 7 days a week, we felt that some kind of consistent backup support, even if limited, was called for. This program attempts to provide that, and we have found it is also useful for training part-time and para-professional support staff about the contents of the various indexes and abstracts. Of course reference questions are not always answered simply by directing people to an appropriate index or abstract, but at least this program points some people in the right direction for beginning a search and they can come back during the day for more complete answers.

The expert system based biographical source selector program, by contrast, is meant to be useful to professional staff as well as to patrons. It takes advantage of the computer's ability to remember and organize a relatively large number, about 60, of both well known and seldom used sources, only some of which are located in our local branch library. Many of these sources are in the circulating collection and even those found in reference are scattered into several different subject areas. With such a variety it is simply impossible for even professional staff to stay fully acquainted with all the available items. Once these items are stored in an intelligent database, however, they can be retrieved without difficulty in response to a few simple queries.

The time taken to program these two programs was about 5 weeks. However, this included learning how to use VP-Expert and collecting all of the data on the sources. For the biographical source program, data collection was actually more time consuming than programming since it required manually searching the collection and listing and annotating all of the possible sources.

At the same time that these two expert system programs were being designed, a hypertext menuing program was developed with MaxThink's PC-Hypertext that guides patrons to dictionaries, encyclopedias and some handbooks in the collection. This program was easier to write than the expert system program, but again the data collection took more time than the programming. Hypertext or other menuing programs can deliver many of the same kinds of functions as our two expert systems, but they are not generally capable of providing the same flexibility or the exactness in the final list presented to the users. Expert systems can fine-tune a final list of sources to fit a large number of variables in the patron's needs.

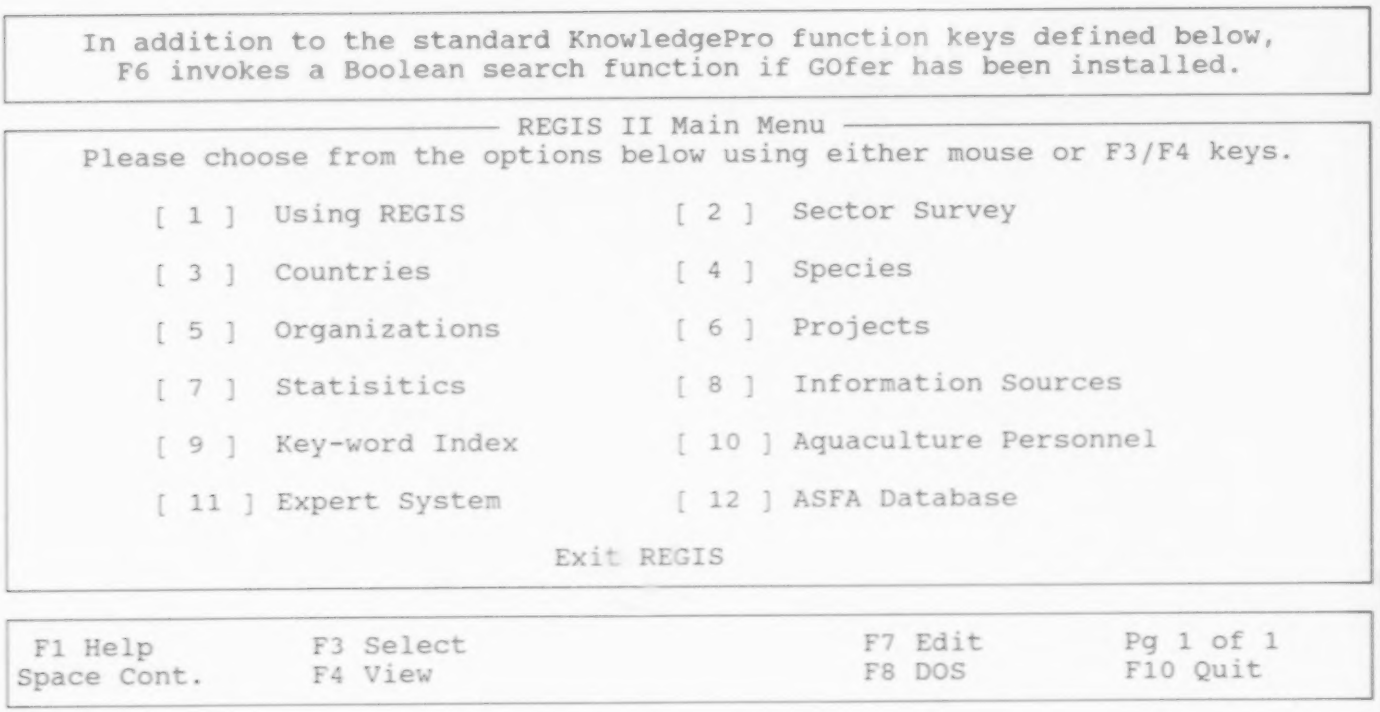
While the biographical and dictionary source selectors have occasionally been used by professional staff, none of these programs have become essential parts of our library's procedures, mainly because we lack adequate hardware to ensure that the programs will be easily available when needed. For any such guide programs to become an integral part of a library's day-to-day functions they really have to be made available on a dedicated terminal rather than compete, as ours do, with popular CD-ROM databases on a multi-use terminal.

For the projects listed above we have worked only with inexpensive expert system and hypertext shells, which is necessitated by the lack of available funds for more sophisticated program developments. Such shells have a number of limitations and shortcomings, particularly in the design of the user interface. Nevertheless, the finished products are easy to use, if not very elegant, and have actually proven to be very useful in some circumstances as well as being good learning experiences.

The potential applications for such tools in reference, as well as in other areas of operation within the library, has only begun to be explored and is virtually unlimited. I strongly believe that such programs are destined to have a profound effect on the library's services and job responsibilities over the next several years.

REGIS II

Development Tool:	KnowledgePro
Developers:	Larry Bielawski, AI Resources, Baltimore, MD Robert Lewand, AI Resources, Baltimmore, MD
Contact:	Gary K. McCone Head, Database Administration Branch Information System Division National Agricultural Library Beltsville, MD 20705 (301) 344-3755


In addition to the standard KnowledgePro function keys defined below,
F6 invokes a Boolean search function if GOfer has been installed.
REGIS II Main Menu
Please choose from the options below using either mouse or F3/F4 keys.
[1] Using REGIS
[2] Sector Survey
[3] Countries
[4] Species
[5] Organizations
[6] Projects
[7] Statisitics
[8] Information Sources
[9] Key-word Index
[10] Aquaculture Personnel
[11] Expert System
[12] ASFA Database
Exit REGIS
F1 Help
Space Cont.
F3 Select
F4 View
F7 Edit
F8 DOS
Pg 1 of 1
F10 Quit

(Response: 11)

Getting Started in Aquaculture

Return to Main Menu

REGIS EXPERT SYSTEM

Information in this portion of the document is provided as basic guidelines for aquaculture and should not be considered as the only source available today. Please consult additional expertise in your local area such as your county agent, extension specialist, universities and associations before beginning an aquaculture operation. You may also read the expert system instructions at this time.

(Press space bar to begin expert system)

F1 Help	F3 Select	F7 Edit	Pg 1 of 1
Space Cont.	F4 View	F8 DOS	F10 Quit

Return to Main Menu

In Africa, aquaculture is characterized by numerous small-scale production units, mainly ponds less than 0.04 hectare (approximately 1/10 acre).

For commercial operations, a large capital investment is required for pond construction. In addition, there will be costs for general operations (transportation, equipment, labor, etc.)

Are you interested in small-scale or commercial aquaculture?

Search strategies available for this topic.

Small-scale
Commercial

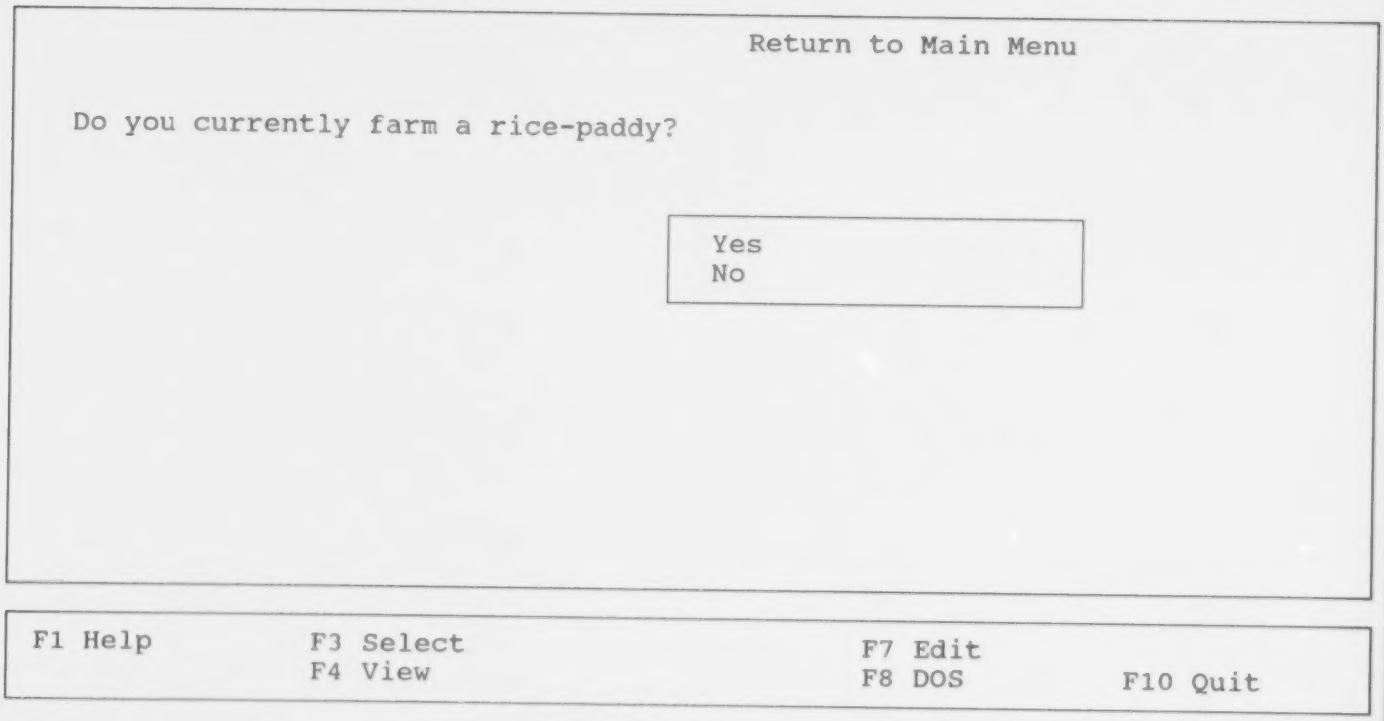
F1 Help F3 Select F4 View F7 Edit F8 DOS F10 Quit

(Response: small-scale)

Return to Main Menu

Pond culture of tilapia is the most successful and widespread technique in Africa. Catfish, too, have been raised successfully. Tilapia and catfish culture will therefore be used here as an example. Other culture systems: raceways, tanks, and cage-culture.

F1 Help	F3 Select	F7 Edit	Pg 1 of 1
Space Cont.	F4 View	F8 DOS	F10 Quit



(Response: yes)

Return to Main Menu

Your access to available land and water for rice farming indicates that little or no cash costs will be involved in labor or capital investment. It is most feasible to use a small section of your rice-paddy, approximately 0.04 ha (approximately 1/10 of an acre) for your pond.

Do you want additional assistance?

Assistance on Stocking
Assistance on General Pond Requirements
No Further Assistance

F1 Help F3 Select F4 View F7 Edit F8 DOS F10 Quit

(Response: assistance on stocking)

Return to Main Menu

Stock a clean, weeded pond with tilapia fingerlings.
For other feasible species, consult the section on
Feasible Species to Culture in Africa.

Do you have a source of fingerlings or brood fish to stock
your pond?

Search strategies available for this topic.

Yes
No

F1 Help F3 Select F4 View F7 Edit F8 DOS F10 Quit

(Response: no)

Return to Main Menu

Consult local suppliers. Fingerlings may be available from neighbors' fish farms. If local sources are unavailable, consider purchasing and transportation costs.

Search strategies available for this topic.

F1 Help	F3 Select	F7 Edit	Pg 1 of 1
Space Cont.	F4 View	F8 DOS	F10 Quit

This concludes the assistance section. What do you wish to do next?

Run the consultation session again
Return to main menu

F1 Help F7 Edit
F8 DOS F10 Quit

Technology Applications

At the National Agricultural Library

REGIS: Intelligent Documents on African Aquaculture

The Food and Agriculture Organization (FAO) of the United Nations and the National Agricultural Library (NAL), U.S. Department of Agriculture (USDA), recently launched a cooperative international project to help provide better access to information on aquaculture in Africa.

Called REGIS (REGional Information System for African Aquaculture), the system merges two popular technologies, hypermedia and expert systems, into a useful and an easy-to-access information retrieval system. The prototype, code named REGIS by FAO Fisheries Information Chief Robert R. Freeman, runs on a microcomputer and is available from the National Technical Information Service.

REGIS was developed using KnowledgePro software from Knowledge Garden, Inc. Using funds provided by FAO and the United Nations Development Programme (UNDP), NAL contracted with two professors at Goucher College in Baltimore, Maryland to assist NAL staff member Deborah Hanfman in developing REGIS.

Hypermedia can be used by an expert to link terms or graphics within one or more documents, allowing a user to browse. Expert systems mimic some of the problem-solving abilities of human experts in a given field. Together hypermedia and expert systems provide structure, procedural control, and the flexibility to explore information.

The system contains the entire text of an "Aquaculture Regional Sector Survey for the Africa Region," compiled by the Aquaculture Development and Coordination Programme, a joint project of FAO and the United Nations Development Programme. Text and graphics can be accessed through a "Table of Contents," individual country names, or species names. A map of Africa gives intelligent non-linear access to a multitude of information linked to a specific country. Names of aquaculture specialists active in Africa can be retrieved from a 25-page document in REGIS. An integrated "expert system" advises on both small and commercial scale aquaculture ventures, utilizing the expertise of Dr. Meryl Broussard, Extension Service, USDA.

A CD-ROM and online connection to REGIS provides fast intelligent access to hundreds of megabytes of citations to published information on aquaculture and fisheries around the world, contained in the Aquatic Sciences and Fisheries Abstracts (ASFA) database. A network of four United Nations agencies and eleven countries compile ASFA. It is produced by Cambridge Scientific Abstracts. Subscriptions are required for both online and CD-ROM access. The production and installation of the ASFA module for online and CD-ROM access was supported by Steven Tibbitt, National Environmental Satellite, Data, and Information Service, NOAA, U.S. Department of Commerce.

"REGIS offers users a fresh and stimulating combination ofapproaches to learning and problem-solving," says Joseph Howard, Director of the National Agricultural Library. "Utilizing other cutting-edge information technology projects at NAL, the Library expects to build even greater power into similar agricultural applications."

TASKS TO BE COMPLETED BETWEEN OCTOBER 1989 AND MARCH 31, 1990

The milestones, their related tasks, and projected time frame for this project are as follows:

Developmental tasks to be completed from October 1 - December 1, 1989 include:

I. Revisions to the original REGIS database.

a) Replace text of the 46-page Report ADCP/REP/88/16, "Aquaculture Regional Sector Survey for the Africa Region" with the revised, final text of Report ADCP/REP/89/36, "A Regional Survey of the Aquaculture Sector in Africa South of the Sahara" by Benedict Satia (Rome, 1989).

b) Give hypertext emphasis to a list of words or phrases in the above document, with the text connected to each such word or phrase.

c) Add a revised list of specialists in African aquaculture with descriptions of their specialities.

d) Make connections from hypertext terms to paragraphs where relevant text occurs rather than to the beginning of chapters, with the requested term highlighted in the paragraph.

e) Provide for the option of moving directly through a series of paragraphs related to the same hypertext button without going back to an intermediate menu. For any highlighted term the user should be given the option of (1) getting more detailed information (normal hypertext), (2) going to the next reference to this topic, or (3) picking another topic using hypertext buttons.

f) Revise the structure of the text so as to provide, in general, for no more than one paragraph to be displayed on one screen.

g) Revise the use of screen background colours so as to avoid the use of bright red, green, cyan, magenta, orange, and brown except for warning, error, or other special highlight messages. In general, bright blue or light colour backgrounds are preferred.

December 1989 - February 1, 1990.
(Briefing: Dec. 7, 1989)

II. Enhancements to REGIS.

a) Add selected bibliographic citations into a new section of REGIS, called "Sources of Published Information". Citations will be identified from copies of FAO Fishery Circulars 723 (Rev.3) and 724 (Rev.3).

b) Add descriptions of aquaculture research and field projects conducted in or otherwise relevant to Africa, into a new section of REGIS, called "Projects".

c) Provide for a smooth, integrated linkage between all separate documents called from a menu.

d) Provide for a fast, integrated text search capability with at least basic Boolean logic operators, to be available for searching for text not given hypertext treatment. (Based on the complexity of this effort, an additional software package or program may need to be integrated into the system.)

e) Add a key word index.

f) Integrate additional graphics into REGIS.

g) Integrate an expert system front-end.

February 1990 - March 1, 1990.
(Briefing: Feb. 8, 1990)

III. Final Modifications.

a) Remove the information search (online, CD/ROM) and expert systems that are in REGIS version 1 from the software delivered to FAO. Maintain these 2 modules for NAL and NOAA.

b) Revise the main menu of REGIS so as to make it list the following topics:

1) Instructions for using REGIS
2) Economic/Institutional Survey*
3) Countries
4) Species
5) People
6) Organizations
7) Projects
8) Aquaculture Sites
9) Statistics
10) Information Sources

*(i.e. the table of contents)

c) Revise the opening screen to indicate that REGIS is a product of the Aquatic Sciences and Fisheries Information System (ASFIS) and provide a hypertext explanation of ASFIS.

March 1990 - March 31, 1990.
(Briefing: Mar. 8, 1990)

IV. Testing and Delivery of Product.

a) Prepare a user manual and a 1-page summarized project fact sheet.

b) Test the system to ensure that it works properly on IBM and compatible microcomputers without requiring more than 640K of memory. It is understood that any new versions of the KnowledgePro software made available by the vendor of that software and not requiring the availability of Microsoft Windows will be incorporated into the package.

c) Provide NAL with:

--3 copies of the final decision tree.

Government Documents Reference Aid

Purpose:	To aid government documents reference service in the Stanford University Libraries
Development Tool:	Level5
Developers:	Bruce Harley Patricia Knobloch
Contact:	Bruce Harley Government Publications San Diego State University Library San Diego, CA 92182-0511 (619) 594-5014 E-Mail: BHARLEY@CYB830.SDSU.CALSTATE.EDU BHARLEY@CALSTATE.BITNET Joan Loftus Jonsson Library of Government Documents Stanford University Stanford, CA 94305 (415) 725-1030 E-Mail: CN.JLO@FORSYTHE.STANFORD.EDU CN.JLO@STANFORD.BITNET

Run Which Knowledge Base ?

Directory : C:\GOVDOCS

INFO	===► INTRO	MAINMENU	NUMBERS
SAT	STATS		

3 DIR 4 OFFK 5 INST 9 HELP 10 EXIT

Introduction

Welcome to Government Documents Reference Aid

Government Documents Reference Aid will help you determine which reference source, such as Socrates or a card catalog, you should use to find the government document(s) you are looking for. Please consult a reference librarian if you need further assistance.

You will interact with Government Documents Reference Aid primarily by selecting items from menus. Selection from a menu is performed by moving the highlighted arrow or bar to the item of choice and pressing "Enter". The arrow keys move the arrow up and down, and the bar right and left.

When you receive instructions to press, for example, "F1" (see below), press only the "F1" function key, not the keys representing the letter "F" and the number "1".

Press "F2" for information on government documents at Stanford.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

BEST COPY AVAILABLE

Information

GOVERNMENT DOCUMENTS AT STANFORD are from U. S. federal, U. S. state and local, foreign, and international government agencies. Government documents are housed in the Jonsson Library of Government Documents, in the Green Library, in branch libraries, and in the coordinate libraries. The Jonsson Library houses most U. S. federal, California, and international government agency documents available at Stanford. Most document serials (magazines, yearbooks) regardless of location, are included in Socrates, the online catalog of the Stanford University Libraries. In general, document monographs (books) housed in the Green Library stacks or branch libraries are fully cataloged and included in Socrates and/or the main card catalog in Green Library. Most document monographs housed in the Jonsson Library of Government Documents are not cataloged and do not appear in Socrates or the main card catalog. The Jonsson Library card and/or book catalogs provide access to document monographs housed there. Holdings for most document serials available at Stanford are maintained in the Jonsson Library card catalog. Please contact the Jonsson Library (723-2727) for further information.

Press "F2" to begin your search.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

MainMenu

What you are looking for

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

==> information or documents on a subject, from a government agency, or for which you have titles

statistics from a government agency

documents for which you have call numbers

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Subject, Author, Title

Your request is

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

all serial documents including periodicals and yearbooks

==> documents of US government

documents of California State government

documents of California Local governments

documents of Other States governments

documents of International NonUN governments

documents of UN government

documents of Foreign governments

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Subject, Author, Title

U.S. Federal Documents

Treatment at Stanford: Most U. S. federal documents have call numbers based on the Superintendent of Documents classification scheme and are housed in the Jonsson Library. Duplicate copies of some U. S. Federal documents are housed in the Green Library stacks or branch libraries and are fully cataloged.

Strengths: The collection is generally very strong in both paper and microform from the beginning of the first Congress in 1787.

Press "F2" to continue your session.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

BEST COPY AVAILABLE

Subject, Author, Title
Your request is documents after 1972

Move the bar to either TRUE or FALSE by pressing the appropriate arrow key. Select your answer by pressing "Enter". For more information on the choices presented press "F5".

TRUE FALSE

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

(Answer: false)

Subject, Author, Title

The documents you are requesting are

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

from any and all US agencies

==> from just the US Congress

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

115

Subject, Author, Title

Pre-1973 US Federal Congressional Documents

To search for monograph (book) documents from just the US Congress acquired by the Jonsson Library before 1973 use CIS/Index to Publications of the United States Congress (this title varies) in the Jonsson Library reference collection. Note that prior to 1970 a title index to reports and documents is not included.

This index includes most call numbers for material available in the Jonsson Library.

To search for other copies of these documents available at Stanford libraries other than the Jonsson Library use the Stanford main card catalog in Green Library.

Press "F2" to return to the Welcome screen.
To do an additional subject, author, or title search press "F3", "F1" in response to the subsequent query.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

(Answer: F2)

Introduction

Welcome to Government Documents Reference Aid

Government Documents Reference Aid will help you determine which reference source, such as Socrates or a card catalog, you should use to find the government document(s) you are looking for. Please consult a reference librarian if you need further assistance.

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When you receive instructions to press, for example, "F1" (see below), press only the "F1" function key, not the keys representing the letter "F" and the number "1".

Press "F2" for information on government documents at Stanford.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

BEST COPY AVAILABLE

Information

GOVERNMENT DOCUMENTS AT STANFORD are from U. S. federal, U. S. state and local, foreign, and international government agencies. Government documents are housed in the Jonsson Library of Government Documents, in the Green Library, in branch libraries, and in the coordinate libraries. The Jonsson Library houses most U. S. federal, California, and international government agency documents available at Stanford. Most document serials (magazines, yearbooks) regardless of location, are included in Socrates, the online catalog of the Stanford University Libraries. In general, document monographs (books) housed in the Green Library stacks or branch libraries are fully cataloged and included in Socrates and/or the main card catalog in Green Library. Most document monographs housed in the Jonsson Library of Government Documents are not cataloged and do not appear in Socrates or the main card catalog. The Jonsson Library card and/or book catalogs provide access to document monographs housed there. Holdings for most document serials available at Stanford are maintained in the Jonsson Library card catalog. Please contact the Jonsson Library (723-2727) for further information.

Press "F2" to begin your search.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

MainMenu

What you are looking for

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

==> information or documents on a subject, from a government agency, or for which you have titles

statistics from a government agency

documents for which you have call numbers

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Subject, Author, Title

Your request is

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

all serial documents including periodicals and yearbooks

documents of US government

==> documents of California State government

documents of California Local governments

documents of Other States governments

documents of International NonUN governments

documents of UN government

documents of Foreign governments

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Subject, Author, Title

California State Documents

Treatment at Stanford: Most California state documents are housed in the Jonsson Library and have call numbers based on the California State Library classification scheme. They have been included in Socrates since 1986. California state documents received prior to 1986 and housed in the Jonsson Library are listed only in the card catalog in the Jonsson Library. Some California state documents are housed in the Green Library stacks or branch libraries and are fully cataloged.

Strengths: The Jonsson Library has regularly received California state documents since 1968. There are significant holdings for earlier years, most of which are fully cataloged and housed in the Green Library stacks.

Press "F2" to continue your session.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

BEST COPY AVAILABLE

Subject, Author, Title

The documents you request are

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

dated after 1985

==> dated between 1973 and 1985

dated before 1973

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Subject, Author, Title

1973-1985 California State Documents

To search for California State monograph (book) documents acquired by the Jonsson Library from 1973 to 1985 use California State Publications in the Jonsson Library reference collection. Note that a title index is not included.

Beginning in 1958, California State Publications includes most call numbers for material available in the Jonsson Library.

The card catalog in the Jonsson Library lists (by government agency as author, then by title) which of these documents are housed in the Jonsson Library.

To search for other copies of these documents available at Stanford libraries other than the Jonsson Library use Socrates, the online catalog of the Stanford University Libraries, and the Stanford main card catalog in Green Library.

Press "F2" to return to the Welcome screen.

To do an additional subject, author, or title search press "F3", then "F1" in response to the subsequent query.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

(Answer: F8)

BEST COPY AVAILABLE

MainMenu

What you are looking for

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

information or documents on a subject, from a government agency, or for which you have titles

==> statistics from a government agency

documents for which you have call numbers

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Statistics

Your request is

Move the arrow to your item of choice by pressing the appropriate arrow key. Select the item by pressing "Enter". For more information on the choices presented press "F5".

==> statistics from US Federal documents

statistics from US State and Local documents

statistics from International documents

3 STRT 5 EXPL 6 S/R 8 MENU 9 HELP 10 EXIT

Statistics

U.S. Federal Documents

Treatment at Stanford: Most U. S. federal documents have call numbers based on the Superintendent of Documents classification scheme and are housed in the Jonsson Library. Duplicate copies of some U. S. Federal documents are housed in the Green Library stacks or branch libraries and are fully cataloged.

Strengths: The collection is generally very strong in both paper and microform from the beginning of the first Congress in 1787.

Press "F2" to continue your session.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

Statistics

US Federal Statistics

To search for statistics from US Federal documents use American Statistics Index(ASI). This index has been published since 1974 and is available in the Jonsson Library reference collection. It is also available for online ready-reference or fee-based searching as DIALOG File 102. ASI excludes most US Congressional documents. To search for statistics from these documents use CIS/Index to Publications of the United States Congress, published since 1970.

ASI includes the appropriate call numbers for documents available in paper and microform (beginning in 1982) in the Jonsson Library. CIS includes most call numbers for indexed documents.

Press "F2" to return to the Welcome screen.

To do an additional statistics search press "F3", then "F1" in response to the subsequent query.

2 CONT 3 STRT 6 S/R 7 PRNT 8 MENU 9 HELP 10 EXIT

(Answer: F10)

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SYSTEMS AND PROCEDURES EXCHANGE CENTER

SELECTED READINGS

SELECTED READINGS

Alberico, Ralph, and Mary Micco. Expert Systems for Reference and Information Retrieval. Westport, CT: Meckler, 1990.

Aluri, Rao, and Donald E. Riggs. "Application of Expert Systems to Libraries." Advances in Library Automation and Networking 2 (1988): 1-43.

Bailey, Charles W., Jr. "Intelligent Library Systems: Artificial Intelligence Technology and Library Automation Systems." Advances in Library Automation and Networking 4 (1991): forthcoming.

Bailey, Charles W., Jr., Jeff Fadell, Judy E. Myers, and Thomas C. Wilson. "The Index Expert System: A Knowledge-based System to Assist Users in Index Selection." Reference Services Review 17, no. 4 (1989): 19-28.

Bielawski, Larry, and Robert Lewand. Expert Systems Development: Building PC-based Applications. Wellesley, MA: QED Information Sciences, Inc., 1988.

Pedersen, Ken. Expert Systems Programming: Practical Techniques for Rule-based Systems. New York: John Wiley, 1989.